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TABLE OF CONTENTS

Synopsis of West Coast Cerceridæ (Hymenoptera, Cerceridæ). *N. Banks* 1

New Species of Diplosphyronid Pseudoscorpions from Australia. *C. Clayton Hoff* 36

The Genus *Callictita* (Lepidoptera, Lycænidæ). *R. G. Wind* and *H. K. Clench* 57

Field Notes on *Tabanus nigrovittatus* Macquart. *N. S. Bailey* 62

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PSYCHE

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SYNOPSIS OF WEST COAST *CERCERIS*[1] (HYMENOPTERA, CERCERIDÆ)

By Nathan Banks
Holliston, Mass.

The first species of *Cerceris* described from this area was *C. californica* by Cresson in 1865. Since then Provancher described one, Viereck one, Mickel five, and the author several. Having received some additional material, I have put all in synoptic form. Several species described by Viereck and Cockerell from New Mexico occur in southern Arizona, and in a few cases in southern California, so I have included such as I know to occur in southern Arizona.

It has been impossible to be sure in every case to associate the sexes correctly; in some instances either of two species might belong to one of the opposite sex from what is now known, therefore I have described such forms separately.

In the males I find that the shape of the middle lobe of the clypeus and the breadth of the hair-lobes are very useful. The sculpture of the enclosure, though usually fairly constant in each species, is sometimes variable, so of less value than previously considered by writers. The sculpture of the pygidium is less variable, but often similar in several species; the general shape of the pygidium, and the crest of hair at sides quite constant, although often differing in the sexes.

Length and density of hair are also of use. There is little to be found (so far) in the wing, the length of the pedicel of the second submarginal cell is different in a few species. The pale markings are more constant than in many insects; these, and the punctation, and the shape of the clypeal process in the female are of basic importance.

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[1] Published by a grant from the Museum of Comparative Zoölogy at Harvard College.

In several of the species in this paper, *isolde, femur-rubrum, orestes, thione,* the lower part of the outer edge of the lateral lobes is fitted to the edge of the eye for a short distance; this occurs in some of the European species and is the normal condition in the subgenus *Apiratrix.*

Some have used the number of spines on the hind tibia as of specific value, but in our species it is not dependable. In a few species the males have the ends of the last ventral ridge developed, and provided with blunt teeth. In these species the lateral lobe does not reach the eye.

The two subgenera may be distinguished by the following:

At base of second ventral segment is a slightly raised area, often semicircular in outline; the stigma of the fore wings is brown to almost black .... *Apiratrix.*

No raised area at base of second ventral segment; stigma yellowish to ferruginous .... *Cerceris.*

SUBGENUS CERCERIS Latr.

The majority of the species, and all of the larger ones belong to this subgenus.

CERCERIS FEMALES

1. No distinct clypeal process with a free apical edge, or not raised above general surface 2
   A distinct clypeal process, with free apical edge well raised above the general surface of clypeus 6
2. No band on second segment of abdomen 3
   A yellow band on part or whole of second segment ... 4
3. Face below antennæ pale yellowish, except the narrow black lower border of clypeus; supraclypeal carina very long and high, bands on fourth and fifth segments quite broad .... *orestes*
   Face below antennæ with much black; the hump on

clypeus and the outer part of lateral lobes only yellowish, lateral face-marks mostly above clypeus. *insolita*

4. Hind femora wholly pale; abdomen with all segments broadly yellow; venter mostly yellowish, spots on vertex .... *arno*
   Hind femora black, venter also, and other femora mostly black 5
5. Small; with pale band on third ventrite, scape wholly black; first segment small, not equal one-half of second behind; abdomen coarsely punctate, enclosure mostly smooth, with median groove ... *melanthe*
   Rather large; scape with pale spot below; first segment of abdomen broad, equal to one-half of second behind, enclosure roughened, irregularly striate; abdomen finely punctate .... *denticularis*
6. Clypeal projection in form of a large cone, the base occupying almost all of clypeal surface, tapering above to a point; wings brown, enclosure large, with a smooth pale spot in middle .... *macrosticta*
   Clypeal projection not in form of such a large cone 7
7. The projection, short, edge concave, with two membraneous plates hanging beneath; propodeum with or without lateral stripes .... *femur-rubrum*
   The projection has no such plates pendent beneath 8
8. Clypeus with one or two small pointed teeth a little above lower margin of clypeus 9
   The process on clypeus is of other shape 10
9. Two teeth on clypeus; very large species, with very broad face .... *grandis*
   One tooth only on clypeus; rather small species; face of normal width .... *athene*
10. All femora largely black, venter black, clypeal process twice as broad as long, not divided, black beneath. *nigrescens*
    Femora not black, if partly black then venter has much yellow 11
11. Very large, almost wholly yellowish or rufous, last joint of antennæ wholly black; second submarginal cell very large, sides strongly convex, pedicel not

one-third of height of cell; last segment of abdomen with a sharp tooth each side before end; clypeal process divided into two horns .... *frontata*

Not so wholly yellowish or rufous species; last joint of antennæ partly rufous; second submarginal cell not so large; scape (first joint) of antennæ not twice as long as third joint 12

12. Clypeal process broad, divided into two divergent horns 13

Clypeal process without divergent horns 15

13. The separation of horns reaches nearly to base of process 14

The separation reaches hardly more than one-half the length of process; hind femora dark toward tip; enclosure obliquely striate .... *eurymele*

14. Venter black, second segment with a median carina; all femora yellow or rufous; enclosure finely, longitudinally striate .... *sexta*

Venter with much yellow, no carina on second segment; front and mid femora black on base; enclosure more coarsely and obliquely striate *sextoides*

15. Body largely rufous or yellowish; wings quite dark; clypeal process small, lower margin broadly emarginate, and a sharp tooth each side on clypeal margin under the outer corners of clypeal process; enclosure rufous. punctate on sides .... *fidelis*

Enclosure black, striate 16

16. Hind femora, and others, a nearly uniform rufous or yellow 17

Hind femora pale yellowish, tip black, other femora black on base; scape black above 18

17. Tip of clypeal process well raised above clypeus, sides parallel; enclosure obliquely striate .... *nasica*

Clypeal process depressed, slightly tapering, tip hardly its breadth above clypeal surface; enclosure longitudinally striate, scape pale above .... *vicina*

18. Clypeal process, but little elevated, much broader than long, margin broadly truncate .... *varians*

Clypeal process about as long as broad, subtriangular, tapering to black, well elevated .... *æqualis*

MALES

1. Hind femora pale on base, with a large dark mark near tip; clypeus truncate below 2
   Hind femora all dark, all pale, or pale on apical part 8
2. Yellow bands on abdomen so broad on sides as to leave only a median triangular dark spot in front; clypeus with three teeth below; pygidium partly yellow; hair-lobes little more than twice their breadth apart, venter with complete yellow bands 3
   Yellow bands on abdomen not so much broadened on sides, always some black laterally; pygidium black 5
3. Yellow bands on abdomen deeply indented with black in front; hair on propodeum moderately long; hair-lobes not as broad as clypeal truncation *sextoides*
   Yellow bands on abdomen scarcely indented with rufous, wide throughout; hair on propodeum very long; hair-lobes about as broad as clypeal truncation 4
4. First segment black, pale on sides; head without rufous; bands on abdomen broad, scarcely indented; enclosure obliquely longitudinally striate; teeth of clypeus small .... *eurymele*
   First segment rufous, bands sometimes indented with rufous; back of head with some rufous; enclosure obliquely striate on sides, behind with short cross striæ crossing the median groove; teeth of clypeus large .... *nasica*
5. Hair-lobes not twice their breadth apart 6
   Hair-lobes about three times their breadth apart ... 25
6. Hair on face (from side) very long; clypeal margin evenly truncate below, no teeth; pygidium plainly narrowed toward base .... *varians*
   Hair on face very short; clypeal margin with three teeth below; pygidium not narrowed toward base; first segment broader than long 7
7. Enclosure strongly longitudinally striate; second segment band scarcely broader than others; face plainly narrowed above .... *æqualis*

Enclosure rather large, swollen, smooth, with mid groove, a few short striæ in each corner; band on second segment much broader than others; face but little narrowed above .... *posticata*

8. Second abdominal segment without a pale band, hind femora almost wholly brown to black 9

Second segment with distinct pale band 10

9. Face almost wholly pale; band on first segment, pale marks on pronotum, scutellum and often on sides of propodeum; venter with some yellowish *orestes*

Face with only narrow lateral marks pale, no band on first segment, no marks on scutellum nor propodeum, lower face with much silvery hair. *semiatra*

10. A tuft of yellowish spreading hair at each side of pygidium; third submarginal cell with rounded sides; stigma and marginal cell elongate 11

No such tuft of hair each side of pygidium 12

11. Face with dense, erect, very long hair, longer than scape, much long hair elsewhere; yellow bands do not cover the segments at sides; venter black; propodeum and abdomen (except bands) black. *englehardti*

Face with very short hair, scarcely noticeable, yellow bands (except one on second segment) usually cover entire side, venter spotted, thorax and abdomen usually partly rufous .... *fidelis*

12. Enclosure with a smooth pale spot in middle; pygidium broader than long; scape and hair lobes long. *macrosticta*

No such pale area in enclosure, pygidium longer than broad 13

13. Hind femora wholly black at least on inner side, the black of several segments hardly reaches margin 14

Hind femora paler, rufous or yellowish on apical part 15

14. Venter black; the yellow of bands leaves a black crescent ending shortly before lateral margin. *denticularis*

Venter with yellow spots; yellow of bands leave a somewhat diamond-shaped black mark open only to middle part of front margin .... *completa*

15. Hair-lobes less than the breadth of one apart; yellow of clypeus comes to a point in middle of front edge; femora rufous, body black with yellowish marks; abdomen strongly convex transversely .... *thione*

Hair-lobes plainly separated by more than breadth of one of them 16

16. Tip of antennæ black; third joint slender, longer than fourth, marginal cell and stigma very slender; second submarginal cell with curved sides; legs mostly yellowish to rufous; second submarginal cell very large, face much narrowed in middle 17

Tips of antennæ rufous; face less narrowed; second submarginal cell normal size, pedicel full one-half of cell 18

17. Third antennal joint a little longer than the first (scape); face narrowed above, near end of lateral face marks becoming wider again, upper side of lateral lobes curved, supraclypeal mark not above antennæ; hair on vertex, thorax and abdomen grey to reddish brown, on face yellowish white; second submarginal cell very large, sides much curved, pedicel about one-third of cell height .... *orphne*

Third antennal joint not as long as the long scape; face still more narrowed above than in *orphne;* upper side of lateral lobes straight; hair on body mostly white to light grey, ventral fringes white, face with snow-white hair; second submarginal cell still larger, sides more curved, and pedicel less than one-third of cell height .... *frontata*

18. Third antennal joint much longer than the fourth, and a little longer than the first (scape), fourth joint three times as long as broad; enclosure obliquely striate; clypeus impressed above the slightly raised three-toothed margin; pygidium with parallel sides; abdomen black, with subequal bands above and lateral spots below .... *sexta*

Third joint not longer than scape; fourth joint not nearly three times as long as broad ... 19

19. Yellow of clypeus ends below in a point; upper side of the triangular lateral lobes is straight; little if any rufous on propodeum or abdomen . 20

Yellow of clypeus ends broadly below, and at lower margin; often some rufous on thorax and abdomen; lateral lobes with upper side curved ending in a black comma-mark 21

20. A row of white hair across lower face from eye to eye; hair-lobes very narrow; spots on scutellum; enclosure smooth, but anterior corners with a few oblique striæ; sometimes lateral spots on propodeum; venter with little if any yellow. *femur-rubrum*

No row of white hair across lower face; hair-lobes moderately broad, yellow; no spots on scutellum; enclosure with median groove and each side with coarse oblique striæ; venter with yellow bands; sternum with rather long, erect white hair . *vicina*

21. First segment of abdomen plainly longer than broad; face with lateral lobes wholly pale yellowish; propodeum reddish, smooth and shining; clypeal margin slightly rounded, pygidium slender, sides nearly parallel; lateral spots on venter *ferruginor*

First segment not plainly longer than broad; the dorsal surface usually broader than long 22

22. Third joint of antennæ plainly longer than fourth, fourth and fifth both rufous; clypeus projecting below nearly the height of lateral lobes in a short truncate margin; pygidium not twice as long as broad in middle, hind tibia has two basal teeth with an elongate base .... *isolde*

Third joint of antennæ barely if any longer than fourth, ventral punctate areas reduced to a narrow row in the middle 23

23. Venter black, trace of rufous on the sides; clypeal process truncate; propodeum, first, and base of second segment reddish, abdomen slender, the punctate side-lobes of venter much swollen so that

they project below, viewed from side; the ridge on sixth ventral forms a sloping rounded lobe with several teeth on the margin .... *calodera*

Venter with yellow spots or bands; the swollen areas are scarcely noticeable from side view; clypeal projection very faintly tridentate, or the margin at least biconcave 24

24. Lateral face marks reach little above antennæ; rather broad at end, supraclypeal mark also short; scutellum black, or at most with small spot each side, pygidium slender, sides nearly parallel; lateral lobe of sixth segment broadly rounded behind and with two large, black, blunt teeth; and usually some smaller connecting row or ridge with small teeth; the lateral lobe of fifth segment, though fairly long, also shows some small teeth near inner end and hind border .... *populorum*

Lateral face marks reach toward top of eyes, supraclypeal mark extends to anterior ocellus; sometimes spots or band on vertex, and a curved mark back of each eye; scutellum usually broadly yellowish or rufous; propodeum usually wholly rufous, or black; enclosure large, smooth; pygidium with the sides converging toward tip; the lateral lobe of the venter of sixth segment is broad, convex, and shows several rounded teeth, three on the outer corner; lobe of fifth segment has no distinct teeth. *illota*

25. Enclosure longitudinally striate .... *nigrescens*

Enclosure mostly obliquely striate .... *abbreviata*

Cerceris macrosticta V. & C.

Viereck and Cockerell, Jour. N. Y. Ent. Soc., 12: 133, 1904.

A female from Tucson, Arizona, July (Bequært).

Cerceris frontata Say

Say, West. Quart. Rept., 2: 80, 1823.

Leconte Ed., 1: 167, 1859.

From Flagstaff, Arizona, 29 July (Carpenter); Palmerlee, Arizona (Biedermann), and Colton, California (Pilate).

Cerceris sexta Say

Say, Bost. Jour. Nat. Hist., 1: 382, 1837.
Leconte Ed., 2: 763, 1859.

This belongs to the group of *frontata*, but I have not seen it west of Wyoming and Utah.

Cerceris sextoides sp. nov.

Female. In general similar to *sexta* (*biungulata*) and to *eurymele*, but the clypeal process is more widely emarginate than in either, and the horns of the process much more slender and sharply pointed, and not at all angulate at the base of the emargination. The markings are similar to those species, the abdomen with a broad band on each segment, emarginate in the middle of the front; the venter is black on the first and basal half of the second segment. Front and mid femora partly black (not in *sexta*) and the hind femora partly dark above. The hair and sculpture are about as in *eurymele*.

The male is more slender than in *eurymele*, the second and following segments hardly more than two-thirds as broad as in *eurymele*, and the yellow bands are more narrow; the venter has yellow bands or lateral spots, the hair lobes not as broad as the clypeal truncation. The femora of all legs have some black, the hind femora with a large black spot at tip.

Length of ♀ 12 mm., of ♂ 11 to 12 mm.

Holotype ♀ from Lone Tree, Yakima River, Wash., 30 June 1882 (S. Henshaw); allotype and paratypes from Nelson's, Yakima River, 4–5 July, and Camp Umatilla, 26 June, both Washington and by Mr. Henshaw; also from Davis, Calif., 1 July (Bohart), and one "California." Type M.C.Z. no. 23547.

Cerceris grandis Bks.

Banks, Bull. Amer. Mus. Nat. Hist., XXXII: 423, 1913.
Type from Ft. Yuma, Arizona.

Cerceris eurymele sp. nov.

Female. Black, face below antennæ pale yellowish, the front edge of the clypeal process slightly reddish, the lateral spots extend a little above antennæ, basal half of mandibles yellowish, a large elongate spot back of the eyes and basal joint of antennæ yellow, the next four joints and the last joint pale rufous, others dull black; two spots on pronotum, tegulæ, small spot on pleura below tegulæ, postscutellum, and a stripe each side on propodeum yellow. Abdomen with two large spots, almost touching, on first segment; second, third, and fourth with a broad band, occupying almost entire width except a rather square black space in middle of front margin, band on fifth segment also broad, but without indentation; sides of apical segment yellow, and venter with four very broad bands; tip below with some long brown hairs each side; legs mostly yellowish, hind femur with a small dark mark before tip on inner side, hind tibiæ with larger dark mark at tip; extreme bases of front and mid femora black; front basitarsus with six long even bristles on outer side. Wings yellowish hyaline, dark streak beyond the reddish stigma.

Body densely and rather finely punctate; hair on head moderately short, on thorax above shorter, longer hair on back of head, lower pleura, and sides of propodeum. Clypeal process very large, on the plan of *C. sextoides*, but the basal part is much longer, and the lateral parts not so divergent, the tips being very blunt. Enclosure strongly, obliquely striate, rather more coarsely than in *sextoides*, basal segment broader than long, second segment hardly twice as broad behind; pygidium very finely granulate, tip rounded, at base fully once and a half as wide as at tip, sides with fringe of yellow hair.

Male very similar, spot back of eyes small, spots on propodeum sometimes small, yellow bands on abdomen broadly and shallowly emarginate in front, black spots on legs larger; hair on head and thorax very long; pygidium with parallel sides, truncate at tip, and less than twice as long as broad; face of moderate width, mid lobe of clypeus one and one-half times as high as broad, lower margin with three teeth; hair lobes as broad as the truncate edge (broader than in *sextoides*), from side the clypeus is somewhat depressed below, and above very faintly convex, and with much rather long hair.

Length of ♀ 15 mm., of ♂ 13 mm.

The female holotype from Davis, Calif., 30 June (Bohart), M.C.Z. no. 23546, and males from El Cajon, Calif., May 1 (Van Duzee), and Santa Barbara, Calif., 18 July (Cockerell), Riverside, Calif., 4 Oct. (Melander). Very similar to *C. sextoides* but the clypeal process is different, the males with broader hair-lobes, longer hair on body, and the yellow bands on abdomen broader in the middle.

Cerceris englehardti sp. nov.

Male. Body finely punctured; entire body densely clothed with erect, very long hair, white on face, brown on vertex and mesonotum, rest of thorax grey but white on sternum, first segment of abdomen grey hair above, other segments yellowish, venter with dark grey on extreme side, most of venter without hair. On the face some hair is as long as the scape, on vertex longer than scape, on mesonotum somewhat shorter, but on propodeum again longer, quite long above on first segment, but shorter on other segments.

Black, with yellowish markings; face pale yellowish, extending higher than usual, supraclypeal mark reaching the anterior ocellus; scape pale below, dark above, third joint mostly pale all over, beyond the joints are black, but the extreme tip of last is rufous; third joint nearly as long as the scape; pronotum with two yellow spots, a tiny spot on middle of postscutellum, rest of thorax black; no spot on first segment of abdomen, second segment with band very broad on sides, reduced to a line in middle, other segments with band less broad and broadly emarginate in front. Legs yellowish to rufous, front femora black except tip; second femora with black mark at posterior base; third tibia rufous on apical half, basal half paler. Wings quite clear but broadly darkened along outer margin beyond marginal cell, stigma yellow, veins dark.

Clypeus a little higher than broad, swollen on upper part, lower edge with three black teeth; lateral lobes higher than broad, upper edge curved, for a short distance the lobe is against the eye, hair-lobes no broader than lateral lobe and several times their breadth apart, of short white hair. From above the sides of head behind eyes are incurved; hind ocelli fully as near eyes as to each other, enclosure smooth, with a shallow median groove. First segment of abdomen one and one-half times as broad as long, more than one-half of width of second segment behind, no ridge separates dorsum from basal slope. Second segment little longer than third, about as broad as third. Last segment with dense, spreading hair each side of pygidium, latter nearly twice as long as broad in middle, tip truncate, almost as broad as at middle, with fine punctures. Venter shining black, second ventrite longitudinally sculptured, but punctate on sides as other ventrites; the tip of subgenital plate is more narrow than the tip of pygidium, and the corners only slightly projecting, not spine-like. Hind tibia has seven spines above in the row. Wings with a long and clear marginal cell, second submarginal cell large, the pedicel fully one-third of height of cell, the end of second discoidal is further beyond end of cell than in most species.

Length 16 mm.

A male from St. John, Arizona, 27 July 1931 (G. P. Englehardt). Type M.C.Z. no. 27638.

Cerceris orestes sp. nov.

Female. Black with white to pale yellowish marks, coarsely punctate much as in *C. insolita*. Face below antennæ mostly white, the separated spots of *insolita* are here united, lower edge of clypeus black, supraclypeal mark reaches only to antennæ, rest of high carina black, lateral face-marks reach plainly above antennal fossæ, tip truncate. Lower margin of clypeus slightly convex, with six blunt, black teeth, two near middle closer together; white of clypeus broader than high, the comma-mark above middle, lower third of upper side of lateral lobe against eye; interantennal carina very high and short. Scape white below, above black and black out to the rufous last joint; hind ocelli nearer to eyes than to each other, small pale spot back of upper eye.

Two pale spots on pronotum, a band on scutellum, and a long stripe on propodeum, this has a recurved hook at upper end just below sides of enclosure, latter is coarsely punctate, much as on propodeum. First segment of abdomen with a pale yellowish band, sometimes with sides extended forward; third segment wholly pale above, fourth and fifth segments with a broad emargination in front; venter with two or three yellowish spots each side; pygidium fully as long as broad in middle, ends equals two-thirds of middle width.

Legs mostly black, front and mid femora pale on outer half below, basitarsus pale, rest brown, hind femora pale at tip, tibiæ pale beneath, tarsi dark.

Wings hyaline, fore wings with a broad dark costal streak, covering marginal cell and widened a little toward tip, second submarginal cell broad and low, the pedicel almost as long as height of cell.

Face with some white hair, vertex with some dark, but most of body with little and short as in *C. insolita.*

Length of female 9.5 to 11 mm.

Male. Similar to female, but face wholly pale below the antennæ and lateral face-marks not extending so high. The clypeus is higher than broad, a little swollen, lower edge quite short, and with two stout, blunt teeth near middle. Mandibles almost entirely black, extreme tip rufous; third antennal joint plainly a little longer than fourth. Other marks much as in female except on propodeum only a small spot or dot pale, and on venter are two or three pale bands; the wings have the same dark costal streak; enclosure mostly punctured as on propodeum; pygidium much as in female, fully twice as long as broad in middle, tip truncate, fully equal base and about two-thirds of middle width, sides a little curved, with large punctures and black hair; end of subgenital plate with a fairly long, sharp spine each side.

Length of male 6 to 8.5 mm.

From Patagonia, Arizona, 1 to 4 August (Bequaert). Type M.C.Z. no. 27637.

Cerceris insolita Cress.

Cresson, Proc. Ent. Soc. Phila., 5: 129, 1865.

One female from Tucson, Ariz., July (Bequaert).

Cerceris solidaginis Rohw.

Rohwer, Can. Ent., 1908: 323.

This species, separated on males from *femur-rubrum* on having the enclosure with large punctures, not smooth in middle, and no pale lateral mark on propodeum. Of five females before me two have the stripe on propodeum, are larger, broader, three without the stripe are smaller, less broad, and therefore have a slightly less broad clypeal process. In the numerous males most are without the stripe on propodeum, two with only a dot; the sculpture of the enclosure in most of the specimens is more or less irregular. I doubt if it is a distinct species, but the name may be of use for a lower category. Specimens of each form were taken at Tempe on the same dates.

Cerceris femur-rubrum Vier. & Ckll.

Viereck and Cockerell, Jour. N. Y. Ent. Soc., 12: 135, 1904.

No record from California, but since it is very common at Tempe, Arizona, it may occur in southern California. It is structurally much like the eastern *C. compacta*, but much more yellow.

Cerceris fidelis Vier. & Ckll.

Viereck and Cockerell, Jour. N. Y. Ent. Soc., 12: 132, 1904.

Have none from California, but it is so common at Tempe and Tucson, Arizona, it quite possibly occurs in southern California.

Cerceris orphne sp. nov.

Male. Face yellowish, not reaching above antennæ, lateral face-marks truncate above, with moderately short whitish hair, denser long dark hair on vertex. Face broad below, plainly narrowed at antennæ. From side the clypeus is swollen above, below depressed and the free edge is raised a little; this process is short, truncate, each side is thickened and almost makes a blunt tooth at outer corner; hair-lobes almost as broad as lateral lobes; face rather finely and closely punctate; scape of antennæ yellow below, rufous above, second and third joints rufous, beyond becoming deep black, last joint without the rufous. Pronotum with a large yellow spot on each side; band on postscutellum and a short lateral yellowish stripe on propodeum each side; enclosure mostly smooth, a broad median groove, some very short striæ in anterior angles; propodeum with longer and paler hair than on mesonotum. Abdomen rather slender; first segment rufous in middle, yellow on sides, other segments with moderately broad bands on sides, emarginate in middle; venter black, with four yellow spots each side, mostly tapering to point at inner end. Second ventrite longitudinally sculptured; pygidium broad, sides diverging above, one and one-half times as long as broad in middle, with numerous small punctures. Legs pale, the inner base of front and mid femora ferruginous, the hind femora with apical half a little darker than rest; hind tibiæ not darkened near tip, tarsi pale; teeth on hind tibiæ above much sloping. Wings fumose darker on upper part and near tip, stigma and marginal cell elongate; second submarginal about as large as in *frontata*, the sides much curved, pedicel hardly one-third of height of cell.

Length 16 mm.

One male from Jemez Springs, New Mexico, 2 July (Englehardt). Type M.C.Z. no. 23536.

Cerceris æqualis Prov.

Provancher, Add. Hym. Can., 417, 1888.

Female. Black, bases of mandibles, spot on each side of lateral lobe, large one on clypeal process, basal joint of antennæ below, stripe each side by eyes, spot behind eyes, yellowish. Two small spots on pronotum, tegulæ, postscutellum, two spots on first segment, bands on second, third, and fourth, narrow in middle, broad on sides, all about equal, venter with three bands, and last segment with two spots, all yellowish or yellow.

Clypeal projection from above almost triangular, below it is black, and a spine each side on margin of clypeus; enclosure moderately large, rather finely longitudinally striate; pygidium about two and one-half times as long as wide at base, much narrowed toward the tip, dark fringe each side. Front and mid femora dark on base, hind femur and tibia dark on tip, hind tarsus very dark, except a narrow line above on basitarsus. Wings with dark front part, most prominent beyond the yellowish stigma. Body rather finely punctate, hair on head and thorax moderately long.

Male very similar in coloration, but the bands on abdomen are less broad on sides, and the spots on first segment are smaller. The clypeal truncation has three teeth, the hair-lobes about as broad as the truncation; face, from side, is rather short-haired; enclosure longitudinally striate as in the female; pygidium broadly truncate at tip, its base scarcely more narrow, coarsely punctate, one and a half times as long as broad.

Length of ♀ 12 mm., of ♂ 10 mm.

Type of Provancher was simply California, a male. I have identified as it a male from San Mateo Co., Calif., 20 June, and a female from Big Flat, Coffee, Trinity Co., Calif. The description of Provancher would fit the male of *C. varians* just as well.

This species is close to *C. varians,* but the clypeal process is much more elevated, and there is no mark on the propodeum.

In male the face has shorter hair than *varians,* there are teeth on the truncation of clypeus, and the pygidium is scarcely more narrow at base.

Cerceris abbreviata Bks.

Banks, Can. Entom., 1919, 84.

Specimens from Yakima, Little Spokane, Camp Umatilla, all Washington, in July (Henshaw), and Carrville, Trinity Co., Calif., 27 May.

Cerceris completa Bks.

Banks, Can. Entom., 1919, 83.

Have seen only the type from Claremont, Calif.

Cerceris nigrescens Smith

Smith, Cat. Hymen. Brit. Mus., IV: 466, 1856.

Specimens from Wawawai (W. M. Mann); Wenass Valley, 7 July (Henshaw); Spokane, 21 June (Henshaw); Ainsworth, 20 July (Henshaw); and Gulf of Georgia (A. Agassiz), all in Washington. Also occurs in Montana, British Columbia, and eastward.

Cerceris varians Mickel

Mickel, Nebr. Univ. Studies, XVII: 336, 1917.

Paratype before me from Donner Lake, Calif.; others from Mammoth, 17 Sept.; Sequoia National Park, 25 July; and San Mateo County, 20 June, all in California.

Cerceris munda Mickel

Mickel, Nebr. Univ. Studies, XVII: 337, 1917.

Described from Sacramento, Calif. I have not seen it.

Cerceris thione sp. nov.

Male. Black; markings pale yellowish, the face verging to white; most of mandibles, basal joint of antennæ, a small spot back of eyes, pronotum wholly, tegulæ, spot below tegulæ, scutellum, postscutellum and a fairly broad stripe each side on propodeum, pale yellowish; rest of antennæ brown, but rufous below for a few joints and the last joint also rufous. Each segment of abdomen with an apical band, that on second plainly broader than those behind, none much widened on sides; venter with lateral yellow spots on third, fourth, and fifth segments. Legs yellowish, front and mid femora rufous on base, hind femora rufous, darker on lower edge; more than apical half of hind tibiæ black, hind tarsi nearly black, except basitarsi. Wings almost hyaline, brown, beyond the yellowish stigma, the tip more broadly brown.

Hair of face short, white, vertex and thorax densely dark-haired, on propodeum long and white, that on abdomen above longer than usual. Body densely and rather finely punctate.

Mid lobe of clypeus projects triangularly below, and the white hair-lobes are much less than their breadth apart, from side the clypeus is evenly convex; enclosure mostly smooth and shining, sides punctate; basal segment of abdomen much broader than long, fully one-half the apical width of second segment, the abdomen rather broad; pygidium very broad, hardly one and a half times longer than broad, tip truncate, sides somewhat convex; the hind tibiæ are more swollen toward tip than usual, and the outer spines are very prominent.

Length 10.5 mm.

From Colton, Calif. (Pilate), Eddy Collection, 24 August and 4 September, and Claremont, Calif. (Baker). One specimen from Colton is only 8 mm. long. Type M.C.Z. no. 23593.

Cerceris arno sp. nov.

Female. Largely yellowish, face wholly, basal half of the mandibles, and basal joint of antennæ, yellow; vertex with a yellow spot each side from top of eye toward the middle, a very large yellow spot back of eye. Pronotum wholly, tegulæ, a spot below it, yellow, below latter is a rufous stain; scutellum, postscutellum, and most of the sides of propodeum yellow, leaving only a median dark stripe and this is partly rufous; basal segment of abdomen reddish at base, rest yellow, broad bands on next four segments, that on second with a median dark spot in front, the third and fourth acutely emarginate in front with dark, the fifth entirely yellow; the terminal segment yellow, except the rufous to brown pygidium; venter almost wholly yellow, some segments narrowly dark at base; legs almost wholly yellowish to rufous, the tarsi, especially the hind tarsi, darker, and a faint dark mark at tip of hind tibiæ.

Wings yellowish hyaline, yellow-brown in front, stigma yellowish.

Face with much silvery white hair, not very long, but dense, moderately short hair on vertex, thorax, and abdomen. Punctures dense, but not coarse. Mid lobe of clypeus somewhat swollen above, much broader than high, below with a broad truncation; enclosure mostly transversely striate; basal abdominal segment much broader than long; pygidium nearly three times as long as broad at tip, latter somewhat rounded, wider at base, at widest part (above middle) it is twice as wide as at tip, bordered with yellow fringe.

Length 10.5 mm.

From Colton, Calif. (Pilate), Eddy Collection, and mountains near Claremont (Baker). Type M.C.Z. no. 23542. One specimen has the sternum yellowish, and one has a reddish mark on the mesonotum.

Cerceris californica Cress.

Cresson, Proc. Ent. Soc. Phila., 5: 128, 1865.

Described from a male, possibly related to *C. denticularis*. But the legs brownish at base, four anterior femora ferruginous, posterior pair rufopiceous, tibiæ and base of tarsi yellow, is not like *denticularis,* nor is the unusually small first segment tinged with ferruginous at tip.

Cerceris denticularis Bks.

Banks, Bull. Mus. Comp. Zool., 51: 113, 1917.

Specimens from Umatilla, Oregon, and Yakima and Spokane, Wash.

Cerceris posticata Bks.

Banks, Ent. News, 1916, 64.

Described from the Jemez Mts., New Mexico (Woodgate).

Cerceris vicina Cress.

Cresson, Proc. Ent. Soc. Phila., 5: 120, 1865.

Male from Raton Pass, New Mexico, 26 July (James).

Cerceris nasica V. & C.

Viereck and Cockerell, Jour. N. Y. Ent. Soc., 12: 132, 1904.

Jemez Springs, New Mexico, 2 July (Englehardt); 29 June, 2 July (Woodgate).

Cerceris athene sp. nov.

Female. Black; clypeus and bases of mandibles rather rufous, sides of face yellow, back of eyes, also somewhat rufous, a yellow spot near upper end of eye; on vertex back of ocelli are two transverse yellow marks, almost united to form a curved band; basal joint of antennæ rufous, beyond brown; pronotum with the spots almost united; tegulæ rufous on inner part, yellow on outer half; yellow spot just below tegulæ, and below that is a rufous stain; scutellum, postscutellum, and a stripe each side on propodeum, yellow.

First segment of abdomen fully one-half yellow; second yellow, with a median indentation; third broad on sides, narrow in middle; fourth and fifth bands fainter and very narrow; second and third segments of venter yellowish. Legs almost entirely rufous, tarsi dark; wings brownish along front and more definite near tip.

Middle clypeal lobe swollen, and ending in a small median cone-like point, no free edge; enclosure smooth in middle, punctate on sides; pygidium with tip truncate, base about as wide as tip, sides curved so that the widest part is a little above the middle, it is fully one and two-thirds as broad as at tip, rather densely granulate; basal segment of abdomen fully one-half of the second at tip.

Length 10.5 mm.

From Claremont, Calif. (Baker). Type M.C.Z. no. 23537. *C. thione* may be the male.

Cerceris melanthe sp. nov.

Female. Black; face below antennæ, base of mandibles, pronotum, tegulæ, postscutellum and a spot on each posterior side of propodeum, pale yellowish. On abdomen an apical band on each segment; that on first narrow, that on second covering about half of segment, angularly emarginate in middle, those on other segments less wide, but covering about one-half of segment, and more deeply emarginate in front; venter with a large pale yellow spot on each side of third segment. Femora almost wholly shining black, front and mid femora pale at extreme tips, hind trochanters pale, rest of front and mid legs pale, in hind legs fully the apical half of the tibiæ and the tarsi black. Wings hyaline, stigma reddish, beyond is a broad brown streak.

Body rather coarsely punctate, much as in the section with the dark stigma; hair on face short and silvery, but long on edges of lateral lobes, that on vertex dark, on pleura and propodeum longer and pale, abdomen scarcely hairy above, below with a band of rather short hairs on each segment.

Face moderately broad below, no clypeal process, and the broad middle lobe scarcely reaches below the lateral lobes; enclosure with a median groove and the sides roughened, but hardly striate; basal joint of abdomen about as long as broad, not half the apical width of second segment; pygidium elongate, narrowed at each end, more so at base, fully two and a half times as long as broad in middle; the front tarsi (except basal joint) are more broad than usual; teeth on upper edge of hind tibiæ very strong.

Length 6 mm.

From Apache Co., Santa Catalina Mts., Ariz., 25 July, 5500 ft., J. Bequaert collector. Type M.C.Z. no. 23539.

Cerceris calodera sp. nov.

Male. Small, body slender; face fairly broad, barely narrowed at middle; face pale yellowish, with silvery hairs, and white hair-lobes; lateral face marks and supraclypeal mark reach only a little above antennæ. Clypeus swollen, lower margin slightly concave each side and projecting a little in middle, the process broad and truncate. Antennæ short, thick toward the tip, under side of tip rufous, scape pale. Pronotum broadly yellow, the spots nearly touching; mesothorax black, coarsely punctate, two small rufous spots, one on tubercle, other below wing-base; a faint spot each side on scutellum, band on post-scutellum; propodeum rufous, black in middle and enclosure, latter broad, smooth.

Abdomen slender, first segment rufous, its dorsum plainly broader than long; second segment rufous on base, behind is a broad yellow band, narrower bands on other segments, but broader on sides; abdomen from side shows the lateral lobes of venter roundedly projecting below more than in allied species; venter black, a trace of rufous on sides. Each ventral segment, back of second, shows a bristly punctate lobe each side, and connecting punctate ridge in middle. On sixth segment the ridge is elevated, each side into a broad lobe, with several fairly large teeth grouped around the outer corner. Pygidium slender, sides nearly parallel, and nearly twice as long as broad in middle, tip truncate. Legs almost wholly yellowish, tips of hind tibiæ dark, and hind tarsi dusky.

Length 9 mm.

One from Jacumba, Calif., 12 August 1917 (W. M. Wheeler). Type M.C.Z. no. 27622.

Cerceris illota sp. nov.

Male. Face yellowish, the lateral and supraclypeal marks tend to extend upward toward top of eyes and the anterior ocellus, sometimes connected with spots or band on vertex; with short, silvery hair, hair-lobes no broader than lateral lobes. Usually a comma-shaped rufous spot back of each eye, and sometimes a rufous band across vertex from eye to eye, often absent, or two spots. Antennæ with scape pale, second and third joints usually rufous, beyond brown, but tip of last joint rufous, third not longer than fourth. Pronotum with the yellow spots meeting; mesonotum black, stained with rufous, or all rufous, a yellow spot under base of fore wings; scutellum usually rufous, postscutellum yellow; pleura and propodeum black to rufous, yellow stripe each side on propodeum; enclosure fairly broad, smooth, but with one or two punctures in upper corners.

First segment of abdomen rufous, dorsum plainly broader than long; second segment more than twice as broad behind as first, sides broadly convex, a nearly square rufous or black spot indenting the broad yellow band covering the rest of the segment; other segments completely covered with yellow band, sometimes slightly indented in front with rufous; from above the segments show the denticulate appearance at outer hind corners. Venter black, with pale yellowish, punctate spots on side narrowly connected across middle. Pygidium one and one-half times as long as broad in middle, tip usually a little narrowed. Sixth ventrite has a lobe each side tipped with several black (or rufous) teeth, many blunt.

Legs yellowish to rufous, hind femora darker than others, front and mid femora with some large spots of white; hind tibiæ dark beyond middle, hind tarsi dusky.

Wings dark along costa and towards tip as usual.

Length 9 to 11 mm.

From Tucson, Arizona, August (Bequaert), also Patagonia, Arizona, 20 August (Bequaert), and Colton, Southern California, 16 August (Pilate); also two from Palmerlee, Arizona (Biedermann). Type M.C.Z. no. 23541.

Cerceris isolde sp. nov.

Male. Face wholly yellowish up to upper edge of antennal fossæ, with short silvery hair, most dense toward lower margin; hair-lobes yellowish, short; antennæ mostly rufous out to seventh joint, thence black, but the last joint is rufous, and scarcely curved. Face not very broad below and little narrowed above; lateral lobes high, outer side straight, and fully one-third its length against eye. Clypeus projects below the lateral lobes and ends in a truncate process. Head back of eyes rufous.

Pronotum rufous, with two yellow spots above; mesonotum black, closely and coarsely pitted; scutellum broadly and a line on postscutellum yellow; propodeum rufous, the enclosure moderately large, mostly smooth, but a few punctures on sides; median groove on propodeum very distinct, lying in a depression: mesopleura rufous, sternum black.

Abdomen rather slender; dorsum of first segment almost twice as broad as long; second segment twice as broad behind, in front rufous as the first, behind with broad yellowish band, four similar bands behind occupying all of dorsum, last segment also yellow, all with fine whitish hair; pygidium one and one-fourth times as long as broad in middle, tip broad, sides little curved, little narrowed above. Venter with yellow bands, broad on sides, second ventrite yellowish; on the sixth there is a cross-ridge, but without teeth. Legs also wholly yellowish to rufous, hind tibia near inner tip faintly darkened.

Wings darkened in front and towards tip; marginal cell quite long and narrowed toward tip; pedicel of second submarginal fully one-half of cell's height.

Length 10 mm.

From Palmerlee, Arizona, Biedermann coll. Type M.C.Z. no. 23540.

Cerceris ferruginor V. & C.

Viereck and Cockerell, Jour. N. Y. Ent. Soc., 12: 134, 1904.

Described from New Mexico; I have one from Tucson, Arizona, July (Bequaert). The unusual length of the first segment readily distinguishes it.

Cerceris populorum V. & C.

Viereck and Cockerell, Jour. N. Y. Ent. Soc., 12: 135, 1904.

Tucson, Arizona (F. H. Snow).

Cerceris semiatra sp. nov.

Male. Deep black; from middle of third abdominal segment above to tip of abdomen yellow, and a narrow yellowish band on these segments below. On face is a narrow orbital streak, at top occupying hardly one-half of space between eye and antenna, and below running out before reaching the mandibles; the yellowish hair-lobes are short; face below antennæ with much rather long hair, in most views silvery. The antennæ (including scape below) are black. On the pronotum there is a trace of a narrow, yellowish line each side; no other pale on head nor thorax. Legs black, front and mid tibiæ show a pale streak on front side, tarsi more brown, but with white hair appear paler.

Fore wings with usual dark spot at tip; stigma and the veins before it yellow, veins beyond and behind stigma brown.

Face with nearly parallel sides, higher than broad; clypeus quite large, rounded above and on sides, below truncate, and not as coarsely punctate as rest of face. Antennæ as long as width of head, broadened toward tip, third joint short, but a little longer than fourth, a high carina between bases of antennæ. Mesonotum coarsely punctate, enclosure broad and smooth, propodeum very coarsely punctate. First abdominal segment with nearly parallel sides, not one-half the width of hind margin of second segment, latter quite long as usual, sides rounded in to front, surface coarsely punctate, third segment about as broad as second, others shorter; pygidium fully one and one-half as long as broad, tip truncate and more than one-half of base, sides slightly curved; ventral segments without definite fringes.

In fore wings, the third submarginal cell has an oblique base and sinuous tip, and is a little longer than broad, and beyond this cell the marginal cell tapers a little to tip.

Length 10 mm.

One male from Patagonia, Arizona, 20 August (Bequaert). Type M.C.Z. no. 27620.

SUBGENUS APIRATRIX SHEST.

This subgenus is easily separated not only by the original character of a small basal raised area on the second ventrite, but also by the darker color of the stigma, brown to black against the yellow to ferruginous of the typical forms; the lateral lobes reach the eye higher than in many of the true *Cerceris*, and in most of the species there is a mesosternal tubercle in the female.

APIRATRIX—FEMALES

1. Propodeum and base of abdomen rufous; face with three pale spots, lateral lobes black; clypeus with a small median, pointed cone .... *conifrons*
   Propodeum and base of abdomen not rufous, no pointed cone on clypeus 2
2. Front femora impressed on outer dark part when seen from above 3
   Front femora not impressed behind, convex; end of clypeus upraised a little, so with free, dark edge 4
3. Clypeus plainly swollen above, but not quite in a cone; white of clypeus not nearly twice as broad as long; apex of pygidium more than one-half its

greatest width; hind femora more than one-half black below .... *complanata*

Clypeus evenly convex; white of clypeus fully twice as broad as long; apex of pygidium not one-half its greatest width, hind femora not so much black. *vanduzeei*

4. Scape of antennæ pale above and below; often two spots on vertex; marks mostly white; enclosure punctate on sides .... *acanthophila*

Scape of antennæ dark above 5

5. Lateral face marks separated from clypeus by black; enclosure with transverse striæ .... *vierecki*

Lateral face marks reach yellow of clypeus 6

6. Enclosure nearly cross-striate; clypeal lobe short, truncate; face-markings yellowish; pale abdominal bands deeply indented with black; yellow spots on venter .... *minax*

Enclosure largely smooth, not cross-striate 7

7. Enclosure smooth, no punctures; face with much white hair below; clypeal lobe broadly emarginate in middle; yellow of clypeus separated from lateral face marks by a black line; pygidium not especially slender nor narrowed more than usual toward tip; hair-lobes white, broad, partly on clypeus .... *snowi*

Enclosure mostly smooth, but with some striæ or punctures; yellow of clypeus adjoins lateral face-marks 8

8. Enclosure with rather fine oblique striæ each side of median groove; pygidium not particularly slender near tip; clypeal margin scarcely elevated. *hesperina*

Enclosure mostly smooth but fine transverse striæ in upper part, the groove with lines across; pygidium very slender and apical third more narrowed; clypeal margin plainly a little elevated .... *convergens*

APIRATRIX—MALES

1. First and second segments entirely jet black, rest of abdomen with yellow bands; hind legs almost

wholly black; lateral lobes black; hair-lobes so broad they almost touch each other .... *seminigra*
Second segment with a pale band 2

2. Propodeum and first segment reddish, face below antennæ wholly pale .... *conifrons*
These parts not reddish 3

3. Clypeus wholly black as also supraclypeal area; hind femora black almost to tip 4
Clypeus, at least, with a large pale spot 5

4. Enclosure partly punctate; lower face densely white-haired .... *snowi*
Enclosure smooth, corners finely striate; lower face not especially densely hairy .... *convergens*

5. Lateral lobes at least partly black 6
Lateral lobes wholly pale 8

6. A supraclypeal pale mark; clypeus higher than broad; enclosure cross-striate; body very slender. *arizonella*
No supraclypeal mark, at most a dot, body less slender, enclosure not cross-striate; clypeal lobe with three teeth or lobes 7

7. Lateral lobes partly pale; enclosure smooth; teeth of clypeus blunt, rounded; hair-lobes small .. *eriogoni*
Lateral lobes black; no spot on pleura, teeth sharp, mid tooth rounded .... *hesperina*

8. Scape pale above as below; marks white, face rather narrow; lower edge of clypeus trilobed. *acanthophila*
Scape dark above 9

9. Hind femora with apical third beneath pale, venter with some yellowish; two oblique stripes on propodeum 11
Hind femora with less than one-fourth pale; venter black, unspotted 10

10. Clypeus about as broad as high, broad on lower margin, comma-mark a little below middle of clypeus, clypeal edge short, truncate; hair-lobe not equal breadth of clypeal lobe, marks snow-white. *huachuca*

Clypeus plainly higher than broad, comma-mark plainly above middle, a noticeable mass of silvery hair on lateral lobes and lower clypeus somewhat obscuring the hair-lobes; marks yellow, hair-lobes nearly as broad as clypeal lobe .... *complanata*

11. Spots on scutellum and first segment; no pale marks on propodeum; enclosure with oblique striæ; pygidium oblong .... *cockerelli*

Band on scutellum and first segment; two oblique stripes on propodeum behind; enclosure transversely striated; pygidium slender, about equally narrowed at each end .... *vanduzeei*

Cerceris (*Apiratrix*) *convergens* V. & C.

Viereck and Cockerell, Jour. N. Y. Ent. Soc., 12: 136, 1904.

Several from Jacumba, Calif., 12 to 17 August (Wheeler); Patagonia, Ariz., 20 Aug. (Bequaert), and Apache Cp., Santa Catalina Mts., Ariz., 25 July, 5500 feet (Bequaert).

Cerceris (Apiratrix) huachuca sp. nov.

Male. Black, with snow-white marks. Face moderately narrow, white, with short white hair, longer at lower margin; clypeus scarcely higher than broad, comma-mark near middle; clypeal edge short, truncate, hair-lobes not quite as broad as clypeal edge; third joint of antennæ barely longer than fourth, scape above dark, two spots on pronotum, not meeting; two on scutellum, not far apart; line on postscutellum, two small spots, touching on first segment of abdomen; rather broad band on second segment, not broadened on sides; narrow band on tip of next four segments; pygidium twice as long as broad in middle, a little broader above, tip truncate; venter black. Very short pale hairs on abdomen, longer on first segment above, darker, but rather short, on mesonotum.

Hind femora black almost to tip, second femora and first black behind on basal two-thirds; enclosure smooth.

Length 5 mm.

From Patagonia, Arizona, 20 August (Bequaert). Type M.C.Z. no. 27636.

Cerceris (Apiratrix) eriogoni V. & C.

Viereck and Cockerell, Jour. N. Y. Ent. Soc., 12: 139, 1904.

Two from Tempe, 31 July, and 2 August (Bequaert).

Cerceris (Apiratrix) acanthophila Ckll.

Cockerell, Entom., 1897, 135.

Several from Arizona, Tempe, August 1 and 2 (Bequaert); August 5 (Wheeler); Tucson, July (Bequaert); Tucson, September 1–5 (Carpenter). Two females, 4 August, from Tempe, agree with the description of *C. chilopsidis* Vier. & Ckll. and are, I believe, the female of *acanthophila.*

Cerceris (Apiratrix) vierecki sp. nov.

Female. Black. Face with a large pale yellowish spot on middle lobe of clypeus, a spot on outer side of each lateral lobe, a supraclypeal spot, and an elongate spot each side by eye. This leaves on each side a black streak between the supra-clypeal mark and the eye-spot running down on the lateral lobe. Basal joint of antennæ pale beneath, also most of the mandibles, and a small spot behind each eye; most of the antennæ pale below and brown above. Pronotum with a spot each side, tegulæ, spot each side on scutellum, line on postscutellum, all yellowish; sometimes a spot below tegulæ.

Abdomen with a narrow apical band on the first segment, a broad band on the second, broadly emarginate in front; third and fourth segments with a more broadly emarginate band, very narrow in the middle; fifth with a narrow apical band, all yellowish; venter unspotted. Legs very pale, the femora largely black, front and mid pairs with apical fifth pale; hind tibiæ with large black spot over apical half, and the tarsi (except basitarsi) brown.

Wings faintly infumate, stigma brown, and a broad brown streak beyond. Body densely and rather coarsely punctate. Hair on face pale and very short, that on vertex and thorax longer and darker; propodeum and basal segment with long white hair, rest of abdomen hardly hairy above, and few hairs in the ventral bands.

Face moderately broad, border of mid lobe truncate; enclosure with middle groove, and coarsely transversely ridged; basal segment of abdomen broader than long, almost one-half the apical width of second segment; pygidium broader at base than at tip, about three times as long as wide at tip, sides slightly bowed.

Length 6 mm.

From Tempe, Arizona, 1 August (Bequaert). Type M.C.Z. no. 23544.

Cerceris (Apiratrix) conifrons Mickel

Mickel, Trans. Amer. Ent. Soc., XLII: 410, 1916.

Specimens from Tempe, Ariz., 31 July (Bequaert); described from Nebraska and Wyoming, having spread so far may extend into California.

Cerceris (Apiratrix) cockerelli Vier.

Viereck, Proc. Acad. Nat. Sci. Phila., 1902, 731.

Described from La Jolla, Calif.

Cerceris (Apiratrix) complanata Mickel

Mickel, Nebr. Univ. Studies, XVII: 340, 1917.

Described from Auburn, Calif. Specimens from Three Rivers, Calif., 12 to 14 July; and Antioch, Calif., in May and June.

Cerceris (Apiratrix) snowi Bks.

Banks, Can. Entom., 1919, 84.

Based on males from Tucson, Ariz. (Snow), and San Diego Co., Calif. (Van Duzee). I have also a male from Jacumba, Calif., 12 to 17 August (Wheeler), and females from Jacumba, Calif., 12 to 17 August, which are evidently this species.

They are larger than the males; agree with males in lacking a supraclypeal mark, but the clypeus is almost wholly pale, the lower edge of mid lobe black, and forming a slightly bilobed rim; lateral lobes with long silvery hair. Two small spots on scutellum (often absent in the male), a spot below tegulæ (usually absent in male), a spot on the pleural spine; basal segment with a small transverse line or two small spots (as in one of the male types); rest of abdominal marks are like those of the male: that on second broad, that on third broken in one female (as in all males). Legs have black femora, excepting tips of the front and mid pairs. The enclosure is smooth. The pygidium is long, almost to a point below, and with sides much bowed; the front tarsi are flattened.

Length of ♀ 10 mm.

Cerceris (Apiratrix) vanduzeei Bks.

Banks, Bull. Mus. Comp. Zool., LXI: 114, 1917.

Types from San Diego Co., Calif., June (Van Duzee), and also from Claremont, Calif. (Baker).

Cerceris (Apiratrix) arizonella sp. nov.

A small very slender male with supraclypeal area wholly pale and wholly united with lateral face-marks, the latter do not extend down to mandibles, as the lateral lobes are black, antennæ pale rufous, scape beneath white; two white spots on pronotum, nearly meeting; dot on tubercle, two spots on scutellum, and a line on postscutellum, a spot on first segment of abdomen, fairly broad; band on second, and narrow, white bands on those behind, except that on the sixth segment is very faint; venter black.

Except face much like *acanthophila*, but more slender. Face more narrow than that species, the clypeus higher than broad, from side, evenly convex, lower margin convex; hair-lobes very short; antennæ quite slender, third joint much longer than fourth, last joint but little curved; mesonotum coarsely pitted, with little very short hair; propodeum roughened somewhat transversely, enclosure with transverse striæ. First segment of abdomen about as broad as long, sides slightly rounded, all segments coarsely punctate, third and fourth segments of equal width, pygidium small and slender, base about one-half width, tip about half the width of base, rounded, surface with a few large punctures.

In the fore wings the third submarginal cell is no longer than broad, beyond it the marginal cell is narrowed toward tip.

Length 5 mm.

One male from Tempe, Arizona, 1 August (Bequaert). Type M.C.Z. no. 23538.

Cerceris (Apiratrix) seminigra sp. nov.

Male. Deep black; first and second segments of abdomen jet black, no pale marks, third to sixth segments inclusive entirely yellow above. Venter with yellow spots on sides of segments four to sixth; face with lateral marks touching a large spot on clypeus, lateral lobes and face above clypeus black; long silvery hairs on face-marks and lower face; antennæ rufous, darker toward tip, scape below pale. Two small spots on pronotum, tegulæ, two fairly large spots on scutellum, all pale yellowish. Hind legs almost wholly black, a small pale streak at base of tibia above, front and mid legs wholly black on femora; tibiæ black except yellow on upper side; tarsi pale. Wings slightly fumose, darker in front toward tip, stigma brown.

Face rather wider above than below, clypeus rounded above and on sides, almost as long as broad, below convex; the white hair-lobes very broad, almost meeting in middle; a moderately high carina between antennæ; anterior ocellus hardly larger than others, and about one and one-half diameter from them. Antennæ short, not equal width of head, broader towards tip, third joint slender, much longer than the fourth. Hair on head and mesonotum plainly shorter than usual; enclosure smooth, with distinct mid groove. Abdomen rather short, first segment broader than long, fully one-half of hind width of second segment, latter not as long as usual, but broader in front at attachment, third segment scarcely broader than second. Pygidium about one and one-half times as long as broad, tip very broad, truncate, nearly as broad as the base, slightly broader in middle, surface minutely granulate, and with about ten large punctures. Much long white hair on underside of last three segments. Fore wings have the marginal cell a little narrowed toward tip, second submarginal with very short pedicel, third a little longer below than broad, outer side bent a little near end, not sinuous.

Length 7 mm.

One male from Patagonia, Arizona, 20 August (Bequaert). Type M.C.Z. no. 27621.

Cerçeris minax Mickel

Mickel, Nebr. Univ. Studies, XVII: 339, 1917.

I have a paratype from Auburn, Calif.; also described from Sacramento.

Cerceris hesperina Bks.

Banks, Bull. Mus. Comp. Zool., LXI: 115, 1917.

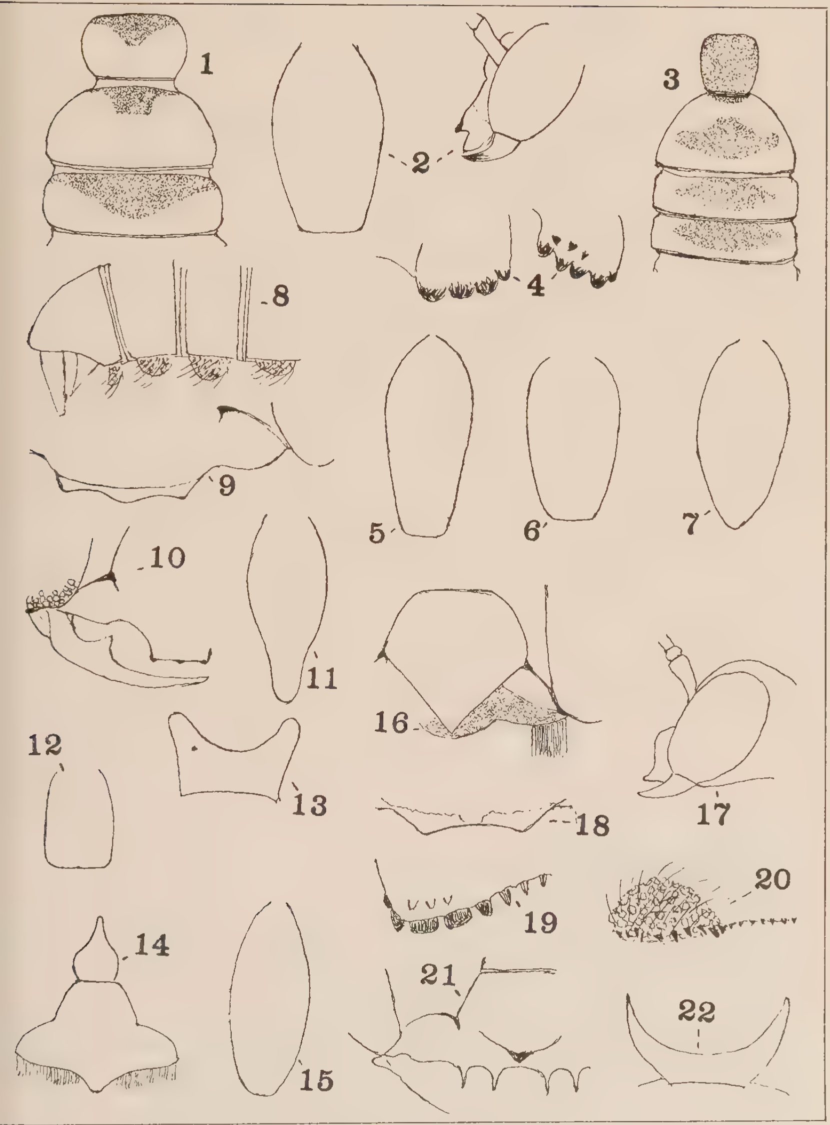
Specimens from Ainsworth, 20 July and Yakima City, 2 July, both Wash. (Henshaw).

C. pudorosa Mickel (Nebr. Univ. Studies, XVII: 338, 1917) appears to be a synonym; *hesperina* has several months priority.

EXPLANATION OF PLATE 1

Fig. 1. *Cerceris athene,* base of abdomen.
Fig. 2. *Cerceris athene,* pygidium, side of head.
Fig. 3. *Cerceris completa,* base of abdomen.
Fig. 4. *Cerceris illota,* teeth on lobe of sixth ventrite.
Fig. 5. *Cerceris arno,* pygidium.
Fig. 6. *Cerceris vierecki,* pygidium.
Fig. 7. *Cerceris snowi,* pygidium.
Fig. 8. *Cerceris calodera,* side-view of abdomen.
Fig. 9. *Cerceris illota,* clypeus.
Fig. 10. *Cerceris isolde,* clypeus.
Fig. 11. *Cerceris convergens,* pygidium.
Fig. 12. *Cerceris æqualis,* pygidium.
Fig. 13. *Cerceris eurymele,* clypeal process from above.
Fig. 14. *Cerceris thione,* clypeus from in front.
Fig. 15. *Cerceris melanthe,* pygidium.
Fig. 16. *Cerceris femur-rubrum,* clypeus of male.
Fig. 17. *Cerceris complanata,* head from side.
Fig. 18. *Cerceris populorum,* edge of clypeus.
Fig. 19. *Cerceris populorum,* teeth on lobe of sixth ventrite.
Fig. 20. *Cerceris illota,* lobe of fifth ventrite.
Fig. 21. *Cerceris athene,* clypeus.
Fig. 22. *Cerceris sextoides,* clypeal process from above.

PSYCHE, 1947 VOL. 54, PLATE 1



BANKS—CERCERIDÆ

NEW SPECIES OF DIPLOSPHYRONID PSEUDOSCORPIONS FROM AUSTRALIA[1]

By C. Clayton Hoff
Department of Zoölogy and Parasitology,
Colorado Agricultural and Mechanical College

Through the kindness of Professor Nathan Banks, the writer has been able to study the collections of Australian and New Zealand pseudoscorpions deposited in the Museum of Comparative Zoölogy. The majority of these collections were taken by members of the Harvard Australian Expedition in 1931 and 1932.

The present paper is concerned only with the diplosphyronid pseudoscorpions. The specimens have been mounted on microscope slides after being cleared in beechwood creosote. Measurements were made with a calibrated micrometer ocular and are expressed in millimeters. All of the specimens described here have been returned to the Museum of Comparative Zoölogy.

Family OLPIIDÆ Chamberlin 1930
Subfamily Olpiinæ Banks 1895
Genus *Olpium* L. Koch 1873
Olpium zealandiensis sp. nov.

Figures 1–3

Female. Body moderately slender; carapace moderately brown, abdomen and legs light yellowish brown, palpi deep reddish brown. Length of body 2.7 mm. *Carapace* smooth except weakly developed netlike lines on the posterior one-third of the face and along the sides. Setæ sparse, only two setæ along the posterior margin of the carapace. The two eyes of each side separated by less than the diameter of the posterior eye. Lateral margins of the carapace weakly convex, posterior margin nearly straight. Length of carapace about 0.8 mm., greatest width across posterior margin and equal to 0.71 mm., ocular width about 0.5 mm.

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[1] Published by a grant from the Museum of Comparative Zoölogy at Harvard College.

Abdomen elongate with sides weakly and evenly convex, length 1.9 mm., width 1.05 mm. All *tergites* equally sclerotic, not divided, surface marked by very faint netlike sculpturing. Each of the first two tergites with four setæ, more posterior tergites with six setæ, the tenth and the eleventh with 10 setæ. *Sternites* a little more lightly pigmented than the tergites and virtually unsculptured. Most sternites with six to 10 very fine acuminate setæ; sternites not divided.

Chelicera fairly stout, 0.27 mm. long, width of base 0.16 mm. Flagellum of three setæ, anterior one stout and denticulate along the distal one-third; the middle seta about two-thirds the length of the distal one and also subterminally denticulate; the proximal seta inconspicuous, less than one-half the length of the middle one, and apparently acuminate. *Fixed finger* gently curved, with four or five small, retroconical teeth along the distal one-half of the inner margin; lamina exterior wide and conspicuous; distal tooth of serrula interior ligulate and with finely serrate margin, next three more proximal teeth platyform and with serrate margins, other teeth modified to form a velum. *Movable cheliceral finger* a little curved, fairly slender; serrula exterior of 20 ligulate plates; subapical lobe stout and with two rounded cusps; apical tooth no more sclerotic than the rest of the finger; galeal seta inserted near the base of the subapical lobe and not reaching to the tip of the galea; galea (Fig. 1) stout, straight, and with three fairly stout and little-curved terminal and subterminal rami; length of movable finger 0.2 mm.

Palps (Fig. 2) moderately stout; polished reddish brown in color; investing setæ long, acuminate, and fairly numerous; surface smooth except for weakly developed granules on the sides of the maxillæ, on the trochanteral protuberances, on the central portion of the flexor surface of the femur, and along the distal half of the flexor surface of the chelal hand. Maxilla 0.44 mm. long, 0.28 mm. wide; trochanter 0.40 mm. long, 0.24 mm. wide; femur 0.71 mm. long, width 0.26 mm.; tibia 0.71 mm. long, 0.31 mm. wide; chela without pedicle 1.16 mm. long, 0.44 mm. wide; chelal hand without pedicle 0.60 mm. long, 0.42 mm. deep. From the side, chelal hand (Fig. 3) stout, depth little less than the width; hand not much narrowed towards the fingers; length of movable finger 0.62 mm. Many marginal teeth of chelal fingers broken but apparently about 45 conical and cuspid teeth distributed along nearly the entire margin of each finger.

Legs moderately stout, yellow in color; setæ fine and acuminate, sparse on the proximal podomeres but longer and more numerous on the distal podomeres; surfaces of pedal podomeres apparently unsculptured; tarsal claws stout. *First leg* with pars basalis deepest across the distal end, length measured along the extensor margin 0.264 mm., depth 0.13 mm.; pars tibialis stout, extensor margin flatly convex, flexor margin more convex, length measured along the extensor margin 0.22 mm., depth 0.143 mm.; tibia subcylindrical except in the proximal portion, length 0.30 mm., depth 0.103 mm.; metatarsus subcylindrical, length 0.135 mm., depth 0.07 mm.; telotarsus a little deeper proximally than distally, length 0.133 mm., depth 0.067 mm. *Fourth leg* with extensor margin of femur a little flatly convex in the center, more convex near the ends; flexor margin of femur more weakly and evenly convex than the extensor margin; length of pars basalis 0.23 mm.; length of pars tibialis measured along the extensor margin 0.55 mm., depth 0.265 mm.; length of entire femur 0.67 mm.; tibia with extensor margin nearly straight except at the proximal end, flexor margin weakly convex, length 0.50 mm., depth 0.14 mm.; metatarsus subcylindrical, with a long tactile seta inserted very close to the proximal margin, length 0.20 mm., depth 0.095 mm.; telotarsus subcylindrical, length 0.17 mm., depth 0.078 mm.

Genital complex very simple; posterior operculum or third sternite with four setæ. One median and two lateral cribiform plates, all small and subequal in size.

Type locality. The female holotype collected by Mr. G. Archey on Tera Kihi Island, Hauraki Gulf, New Zealand, on October 25, 1924.

Remarks. A single species of *Olpium*, *O. michaelsoni* Tullgren, 1909, has been reported previously from the

Australian region. From the description given by Chamberlin (1930), it is evident that *zealandiensis* differs from *michaelsoni* by having much stouter palpal podomeres. By comparing the palp of *zealandiensis* with the figure given by Beier (1932, fig. 210) for the palp of *michaelsoni*, it may be seen that a number of slight differences exist between the two forms with respect to the shape of the palpal podomeres. *Olpium zealandiensis* may be readily separated from other species of the genus by characteristics of the palpal podomeres.

Genus *Xenolpium* Chamberlin 1930

Xenolpium granulosum sp. nov.

Figures 4–6

Female. Body elongate; length 4.65 mm. *Carapace* light brown in color; posterior margin nearly straight, anterior margin weakly bilobed, lateral margins very weakly convex to straight behind the eyes; posterior margin with two setæ, each placed some distance anterior to the actual margin; anterior margin with four setæ; eyes prominent; anterior eye separated from the anterior carapacal margin by more than the diameter of the eye, eyes of each pair separated by about one-half the diameter of the eye; carapace smooth except for netlike markings along the side and weakly developed granules behind the eyes; length of carapace 1.08 mm.; posterior and greatest width about 0.9 mm.; ocular width 0.5 mm. *Abdomen* much wider than carapace; lateral margins gently convex; length 3.55 mm., greatest width 1.9 mm. *Tergites* light brown in color, surface virtually smooth; first tergite with four setæ, central tergites with six to eight setæ; all tergites undivided. *Sternites* smooth, light brown in color; most sternites with eight, some with six or 10 marginal setæ.

Chelicera moderately deep brown in color; base fairly stout and marked by a few netlike lines on the exterior surface; all setæ long and acuminate; flagellum of four stout blades, each with an almost smooth margin; chelicera 0.29 mm. long, base 0.175 mm. wide. *Fixed finger* with wide and evenly convex lamina exterior; distal one-half of inner margin with five or six retroconical teeth, two other teeth in the inner margin of the apical tooth; terminal plate of serrula interior spinelike, the next three conical, others fused into a velum, all teeth with entire margins. *Movable finger* fairly stout, a little curved; subapical lobe much smaller than the apical tooth and located very close to the latter; serrula exterior of about 20 ligulate plates (exact count prevented by broken plates); galea (Fig. 4) trifid near base, each branch simple and fingerlike; galeal seta fairly stout and not reaching to the tip of the galea; movable finger 0.26 mm. long.

Palps (Fig. 5) moderately stout, deep reddish brown in color; setæ acuminate; surface of podomeres very weakly granular, with the granules minute and hardly discernible on the extensor surfaces of all podomeres except the trochanter; chelal fingers with surface smooth. Maxilla 0.54 mm. long, 0.38 mm. wide; trochanter with conical extensor protuberance and a more rounded subdorsal one, granules of the extensor side confined to the protuberances; length of trochanter 0.54 mm., width 0.31 mm.; femur 0.88 mm. long, 0.35 mm. wide; tibia 0.92 mm. long, with 0.37 mm. Chela from the dorsad with hand stout, fingers gently curved and well separated from the hand; chela without pedicle 1.58 mm. long, 0.55 mm. wide; chelal hand exclusive of the pedicle 0.85 mm. long, 0.49 mm. deep; movable finger 0.8 mm. long. From the side, chelal hand (Fig. 6) subcylindrical; basal margin rounded and blended into the dorsal and ventral margins without interruption; fingers fairly slender; each finger with about 60 marginal teeth distributed along almost the entire finger margin; teeth of the distal portion of each row retroconical and with well-developed cusps, those of the proximal end of each row rounded and acuspid.

The *legs* deep yellow in color; fairly stout; surface apparently not sculptured; setæ long and acuminate, more numerous on the distal than on the proximal podomeres; tarsal claws stout. *First leg* with femoral parts stout, margins of pars basalis flatly convex, margins of pars tibialis more rounded; length of pars basalis measured along the extensor margin 0.285 mm., depth 0.185 mm.;

pars tibialis measured along the extensor margin 0.30 mm. long, 0.182 mm. deep; tibia with extensor margin nearly straight except at the proximal end, weakly convex on the flexor margin, pedicle not developed, length 0.375 mm., depth 0.118 mm.; metatarsus subcylindrical but a little narrowed distally, length 0.16 mm., depth 0.083 mm.; telotarsus like the metatarsus in shape but somewhat more slender, length 0.16 mm., depth 0.067 mm. *Fourth leg* with subtriangular pars basalis, length 0.315 mm., depth 0.20 mm.; flexor margin of pars tibialis almost straight, extensor margin flatly convex with a distinct angulation near the basal end, length measured along the extensor margin 0.78 mm., depth 0.335 mm.; entire femur 0.93 mm. long; tibia and tarsal podomeres with shape much like the corresponding podomeres of the first leg; tibia 0.62 mm. long, 0.175 mm. deep; metatarsus 0.245 mm. long, 0.115 mm. deep; telotarsus 0.225 mm. long, 0.095 mm. deep; metatarsus with a tactile seta located on the extensor surface near the base of the podomere; telotarsus with two tactile setæ, one located 0.045 mm. and the other 0.125 mm. from the proximal margin.

Genital complex very simple. Second sternite or anterior operculum with 11 small marginal setæ; third sternite or posterior operculum with five marginal setæ. Small median and lateral cribiform plates present.

Type locality. The female holotype from Mullewa, Western Australia. Collection made by Dr. W. M. Wheeler on September 20, 1931.

Remarks. *Xenolpium granulosum* appears closely related to *O. amboinensis* Chamberlin, 1930, from the Dutch West Indies. The two species differ by the more slender chela, the basally less truncate chelal hand, and the larger size of the body in *O. granulosum.*

Family GARYPIDÆ Hansen 1894
Subfamily GARYPINÆ Simon 1879
Genus *Garypus* L. Koch 1873
Garypus longidigitus sp. nov.
Figures 7, 8

Female. Body large, stout, 4.4 mm. long; appendages long and slender. *Carapace* light brown in color; surface granular and marked by netlike lines; anterior margin bilobed, lateral margins weakly convex; eyes large, the eyes of one side separated by less than one ocular diameter; eyes removed from the anterior carapacal margin by between two and three ocular diameters; transverse furrows weakly developed; setæ scattered, fairly numerous; length of carapace 1.28 mm., greatest width posteriorly and equal to 1.1 mm., ocular width 0.7 mm. *Abdomen* oval-elongate, length 3.1 mm., width about 1.9 mm. *Tergites* 2 to 10 divided; surface sculptured as on the carapace; brown in color; setæ weak and short; first tergite with 10 setæ, half-tergites of central and posterior part of body with six or seven setæ along the posterior margin and two or three setæ along the lateral margin; intertergal membranes and median membranes between half-tergites continuous, wide, and marked by wavy striations. *Sternites* 4 to 10 divided; very lightly pigmented, especially anteriorly; sculpturing scalelike or netlike and much more weakly developed than on the tergites; setæ short, fine, more or less similar in number and arrangement to those of the tergites; intersternal membranes like those of the tergites. *Pleural membranes* wide, marked by rugose or papillose striations. Stigmata placed entirely in the pleural membranes and not on the sclerotic sternal halves.

Chelicera fairly sout, yellowish brown in color; length 0.36 mm., width of base about 0.215 mm. Base quadrate; inner margin with a deep sinuation between the base and the fixed finger; setæ *is*, *ls*, and *sb* located on the promixal half of the fixed finger; dorsal surface of base weakly sculptured by netlike lines. *Flagellum* with three stout and much flattened blades; the posterior blade two-thirds as long as the anterior one, the central blade intermediate in length; each blade denticulate, with the teeth long, slender, irregular in distribution and length, and confined to the distal two-thirds of each blade. *Fixed finger* very convex, with well-rounded lamina exterior; apical tooth very dark brown and sclerotic, with two small denticles on the inner surface; inner margin of finger with one or two stout, sclerotic, retroconical distal teeth followed proximally by three to five weaker, non-sclerotic, retroconical teeth becoming progressively smaller in size; distal plate of serrula interior spinelike and directed anteriorly. *Movable finger* gently curved; apical tooth acute, darkly pigmented, and sclerotic; subapical lobe subdivided distally into two acute teeth; galeal seta inserted at the level of the subapical lobe and not reaching to the tip of the galea; serrula exterior partly broken but probably composed of about 25 ligulate plates; galea stout, fairly straight, with six slender and gently curved simple rami confined to the distal one-third; length of movable cheliceral finger about 0.31 mm.

Palps (Fig. 7) slender; yellowish brown except chela reddish brown; surface of podomeres except the chelal fingers marked by netlike lines and granulations; setæ fairly numerous, short, acute, slightly curved, and inconspicuous. Maxilla 0.78 mm. long, about 0.5 mm. wide; trochanter 0.65 mm. long, 0.38 mm. wide; femur 1.65 mm. long, 0.318 mm. wide; tibia 1.38 mm. long, 0.35 mm. wide; chela without pedicle 2.65 mm. long, 0.65 mm. wide; depth of chela 0.59 mm., length of hand without pedicle 1.1 mm.; length of movable finger 1.65 mm. Shape of chela from the side and the arrangement of tactile setæ as shown in figure 8. Marginal teeth of chelal fingers cuspid, arranged along the entire finger margin; about 85 teeth on the fixed finger, about 70 teeth on the movable finger; teeth near each end of the row on each finger more or less conical, those of the center of the row on the fixed finger retroconical, those of the center of the row of the movable finger retroconical to much flattened so that they are much less acute than the opposing teeth of the fixed finger.

Legs very slender; deep yellow in color; surface marked by netlike lines; setæ like those of the palpi, except longer and more numerous on the flexor surfaces of the tibial and tarsal podomeres. *First leg* with stout trochanter, 0.33 mm. long, 0.235 mm. deep; pars basalis slender, flexor margin nearly straight, extensor margin convex in the center, podomere deepest near the distal end, length measured along the extensor margin 0.62 mm., depth 0.185 mm.; pars tibialis subcylindrical, length measured along the extensor margin 0.39 mm., depth 0.18 mm.; tibia with extensor margin convex, flexor margin concave, deepest at the distal end, length 0.57 mm., depth 0.135 mm.; metatarsus subcylindrical in shape, length 0.38 mm., depth 0.105 mm.; telotarsus 0.345 mm. long, 0.1 mm. deep. *Fourth leg* with trochanter 0.55 mm. long, 0.24 mm. deep; pars basalis subtriangular in outline, 0.395 mm. long, 0.215 mm. deep; pars tibialis with very weakly convex flexor margin continuous with the margin of the pars basalis, extensor margin weakly to flatly convex but a little more convex basally than distally, length measured along the extensor margin 0.995 mm., depth 0.275 mm.; entire femur 1.25 mm. long; tibia shaped as in the first leg but much more slender, length 0.98 mm., depth 0.15 mm.; metatarsus subcylindrical but a little narrower across the distal than the proximal end, length 0.48 mm., depth 0.13 mm.; telotarsus 0.38 mm. long, 0.12 mm. deep.

Genital complex simple; anterior operculum with 17 setæ, many of which are arranged in a row along the posterior margin; posterior operculum or third sternite with eight setæ forming a single row; lateral cribiform plates smaller than the somewhat fragmented median plate.

Type locality. Weier, Murray Islands, Torres Strait, Queensland. Collection made by H. L. Clark on October 4, 1913. Unfortunately, no ecological data accompany the single individual (holotype) in the collection.

Remarks. This is the first record of the genus *Garypus* L. Koch from the Australian region and its occurrence fulfills a prophecy made by Chamberlin (1934) that the genus should be present in Oceania.

Garypus longidigitus is readily separated from other species of the genus by the characteristics, especially the length : width ratios, of the palpal prodomeres. The very long and slender chelal fingers are among the most significant of the diagnostic features.

Genus *Synsphyronus* Chamberlin 1930

Synsphyronus + *Maorigarypus* Chamberlin, 1930, Ann. and Mag. Nat. Hist., ser. 10, 5: 616, 617.

Synsphyronus + *Maorigarypus* Chamberlin, 1931, Stanford Univ. Publ., Univ. Ser., Biol. Sci., 7(1): 135, 153, 155, 208, 215, 228 (figs.).

Synsphyronus Chamberlin + *Synsphyronidæ* Beier + *Maorigarypus* Chamberlin, Beier, 1932, Das Tierreich, 57: 226, 238.

Synsphyronus emend., Chamberlin, 1943, Ann. Ent. Soc. Amer., 36: 488, 489.

Genus emendatus. On studying in detail the new species described below, it becomes obvious that the species belong to the genus *Synsphyronus* in spite of the presence of seven, instead of eight or nine, tactile setæ on the fixed finger of the palpal chela. Since Chamberlin (1943) has shown that the variable number of tactile setæ is not a useful diagnostic character in this genus, there is no justification for the erection of a new genus. As a result, the genus *Synsphyronus* is hereby emended to include forms that have seven to nine tactile setæ on the fixed chelal finger.

The presence of seven setæ on the fixed chelal finger indicates relationship to the genus *Anagarypus* Chamberlin, 1930. However, the nature of the vestitural setæ of the palps and the position of tactile seta *est* of the fixed chelal finger preclude assignment of the present three species to the genus *Anagarypus*.

Synsphyronus (Maorigarypus) niger sp. nov.

Figures 9, 10

Male. Body, legs, and cheliceræ brown in color; palpi dark reddish brown; sculpturing of body and appendages as in the genus; length of body 3.6 mm. *Carapace* as in the genus; eyes of each side separated by about the lesser diameter of the anterior eye; carapacal furrows not evident; posterior margin with four setæ; length of carapace 1 mm., greatest width across the posterior margin and equal to 1.1 mm., ocular width about 0.6 mm. *Tergite* 1 with six setæ; each half of tergite 2 and tergite 3 with three setæ, more posterior tergites with four or five setæ on each half; tergal setæ subclavate to clavate. *Sternites* with setæ acuminate to terminally truncate; setæ similar to those of the tergites in number and arrangement; contral sternites not divided, anterior and posterior ones divided. *Abdomen* stout, 2.6 mm. long, about 1.85 mm. wide.

Chelicera with chætotaxy and flagellum as in the genus; length of chelicera 0.25 mm., width of base about 0.16 mm. Inner margin of fixed finger with three or four retroconical teeth, inner margin of apical tooth of fixed finger with two small denticles. *Movable cheliceral finger* a little curved; subapical lobe very near the base of the apical tooth; serrula exterior of 18 ligulate plates; galea relatively short, simple, stout, terminally rounded and without rami; length of movable finger 0.19 mm.

Palps (Fig. 9) very similar in outline to those of other species of the genus. Setæ of maxilla chiefly acuminate; setæ of the trochanter, femur, and tibia distinctly clavate; setæ of the chelal hand subclavate to clavate; setæ of the fingers acuminate and relatively long. Maxilla 0.60 mm. long, 0.34 mm. wide; trochanter nearly square in outline with the pedicle short and stout, length including pedicle 0.47 mm., greatest width taken at about a right angle with the longitudinal axis 0.37 mm.; femur 1.07 mm. long, width 0.30 mm.; tibia 0.81 mm. long, 0.325 mm. wide; chela basally truncate and little convex, fingers very slender in relation to the hand and gently curved; length of chela without pedicle 1.52 mm., width 0.44 mm.; length of hand without pedicle 0.83 mm., depth of chelal hand 0.36 mm.; length of movable finger 0.70 mm. *Marginal teeth* of the chelal fingers conical to retroconical in the distal part of the row of each finger, much flattened in the proximal portion of each row; cusps poorly developed; about 35 teeth on the movable finger, about 45 on the fixed finger. *Tactile setæ* arranged as shown in figure 10.

Legs dark brown in color, with the more distal podomeres somewhat dusky; setæ of femoral parts and the extensor margins of the more distal podomeres clavate, being conspicuously long and club-shaped on the tarsal podomeres of the fourth leg; setæ of the flexor surface of the tibial and tarsal podomeres acuminate; tarsal claws moderately stout. *First leg* with trochanter 0.245 mm. long, 0.175 mm. deep; pars basalis with flexor margin more or less evenly convex, 0.253 mm. long, 0.163 mm.

deep; pars tibialis with evenly convex extensor margin, flexor margin bulging near the center; length 0.285 mm., depth 0.19 mm.; tibia as in other species of the genus, length 0.335 mm., depth 0.125 mm.; metatarsus subcylindrical, length 0.158 mm., depth 0.095 mm.; telotarsus with both margins a little convex, length 0.145 mm., depth 0.075 mm. *Fourth leg* with extensor margin of the trochanter evenly convex, length 0.365 mm., depth 0.17 mm.; pars basalis subtriangular in shape, 0.265 mm. long, 0.19 mm. deep; pars tibialis with extensor margin more or less evenly but not strongly convex, flexor margin nearly straight and continuous with the flexor margin of the pars basalis, greatest length 0.61 mm., depth 0.245 mm.; entire femur 0.80 mm. long; tibia very weakly S-shaped, length 0.49 mm., greatest depth in the distal half and equal to 0.14 mm.; metatarsus subcylindrical, 0.195 mm. long, 0.102 mm. deep; telotarsus stout, length 0.19 mm., depth 0.10 mm.

Genital complex with the anterior operculum asetaceous except for six small acuminate setæ just anterior to the genital pore; posterior operculum with seven or eight small setæ approximate to the genital pore and five longer setæ along the posterior margin. Both opercula with numerous slitlike lyrifissures.

Type locality. The single male, the holotype, collected by Dr. P. J. Darlington on November 30, 1931, at Adelaide, South Australia.

Remarks. The present species differs from all previously described species of the subgenus *Maorigarypus* by having two rather than one or three tactile setæ on the movable chelal finger and differs from all described species of the genus *Synsphyronus* by having only seven tactile setæ on the fixed chelal finger. *Synsphyronus niger* is similar in these characters to *S. magnus* described below. Methods of separating these two species will be given under the description of the latter.

Synsphyronus (Maorigarypus) magnus sp. nov.

Figures 11, 12

Female. Very large; body ovate in general shape; abdomen, carapace, and legs light to medium brown; palpi deep reddish brown; sculpturing as typical in members of the genus; body 4.45 mm. long. *Carapace* as in the genus; anterior eye of each side narrowly elliptical and separated from the posterior eye by about twice the lesser diameter of the anterior eye; a heavily sclerotized keel or ridge between the eyes, reaching its greatest development at the anterior border of the posterior eye; anterior eye removed from the anterior carapacal margin by a distance equal to four or five times the diameter of the posterior eye; lateral margins of carapace gently and evenly convex; posterior margin with six marginal setæ; length of carapace 1.35 mm.; greatest width along the posterior margin and equal to 1.5 mm.; ocular breadth about 0.8 mm. *Tergites* 2 through 10 divided; tergites 4 through 10 with each tergal half marked by a centrally located and more deeply pigmented spot; setæ subclavate, terminally truncate but not much widened; tergites 1 and 2 with eight setæ; other tergites with 10 to 16 setæ. *Sternites* 5 through 10 marked by pigmented spots similar to those of the tergites; division of some sternites weakly indicated; sternite 4 with eight marginal setæ; setæ of other sternites ranging from 10 to 14; setæ of anterior sternites acuminate, some setæ of posterior sternites weakly subclavate. *Abdomen* stout; 3.1 mm. long, about 2.5 mm. wide.

Chelicera as usual in members of the genus; longest blade of flagellum with three or four slender and long dentations placed a little distal to the midpoint; length of chelicera between 0.35 and 0.36 mm., width of base 0.21–0.22 mm.; length of movable finger about 0.26 mm. *Fixed finger* with relatively narrow lamina exterior; four retroconical teeth on the distal half of the inner finger margin, two smaller denticles on the inner margin of the apical tooth. *Movable finger* little curved; subapical lobe poorly developed, located approximate to the apical tooth; apical tooth little sclerotic; galea gently curved, simple, stout, terminally rounded and blunt, with conspicuous gland ducts passing from the base to the tip; serrula exterior of 19 ligulate plates; galeal seta not reaching nearly to the tip of the galea.

Palps (Fig. 11) with sculpturing and general shape of podomeres as usual in members of the genus; setæ of the maxillæ weakly subclavate like those of the tergites; setæ of all other podomeres of the palp, including both margins of the chelal hand, short, stout, clavate, and fairly numerous; setæ of the chelal fingers acuminate. Maxilla 0.81 mm. long, 0.46 mm. wide; trochanter including pedicle 0.67 mm. long, greatest width measured at about a right angle to the longitudinal axis 0.51 mm.; femur 1.50 mm. long, 0.39 mm. wide; tibia 1.17 mm. long, 0.42 mm. wide; length of chela without pedicle 2.05 mm., width 0.63 mm.; length of hand without pedicle 1.16 mm., depth 0.53 mm.; length of movable fingers 0.97 mm. Marginal teeth of chelal fingers weakly retroconical and strongly cusped in the distal part of the row, but flattened and acuspid in the proximal portion of the row of each finger; about 40 teeth on the movable finger and about 45 on the fixed finger. Movable finger with two tactile setæ, the fixed finger with seven, distributed as shown in figure 12.

Legs as typical in the subgenus *Maorigarypus;* anterior legs stout, posterior legs relatively slender; yellowish brown in color; tarsal claws moderately stout; setæ of the femur and the extensor margins of the tibial and tarsal podomeres short and subclavate to clavate, setæ of the flexor margins of the tibial and tarsal podomeres acuminate and relatively long. *First leg* with flexor margin of trochanter evenly covex, 0.35 mm. long, 0.25 mm. deep; pars basalis with both extensor and flexor margins weakly convex, the flexor flatly so, length measured along the extensor margin 0.35 mm., depth 0.24 mm.; pars tibialis subfusiform, length 0.40 mm., depth 0.27 mm.; tibia stout, the extensor margin weakly concave except in the proximal one-fourth, flexor margin convex, length 0.50 mm., depth 0.175 mm.; tarsal podomeres subcylindrical; metatarsus 0.21 mm. long, 0.13 mm. deep; telotarsus 0.225 mm. long, depth 0.11 mm. *Fourth leg* with extensor margin of trochanter highly arched or covex, flexor margin weakly but evenly convex, length 0.52 mm., depth 0.265 mm.; pars basalis subtriangular, 0.355 mm. long, 0.23 mm. deep; pars tibialis with extensor margin flatly convex, flexor margin weakly concave and continuous with that of the pars basalis; length of pars tibialis measured along the extensor side 0.91 mm., depth 0.28 mm.; entire femur 1.16 mm. in length; tibia weakly S-shaped, length 0.75 mm., depth 0.18 mm.; both tarsal podomeres subcylindrical; length of metatarsus 0.275 mm., depth 0.135 mm.; telotarsus 0.28 mm. long, depth 0.13 mm.

Genital complex simple, opercula little differentiated; anterior operculum with eight setæ, chiefly along the medial portion of the posterior margin; posterior operculum with nine marginal setæ; cribiform plates relatively large; two median plates with one located anterior to the other, the posterior one the smaller; lateral plates subequal in size to the larger of the median plates.

Type locality. A single specimen, the female holotype, in a collection taken by Dr. P. J. Darlington in November, 1931, on the Margaret River, Western Australia.

Remarks. The present species may be separated from other members of the subgenus *Maorigarypus*, except *S. niger*, by the reduced number of tactile setæ on the fixed chelal finger and by the presence of two tactile setæ on the movable finger. From *S. niger*, *S. magnus* may be separated by the larger size of the body and appendicular podomeres, differences in shape of the palpal tibia, and differences in the nature of the carapacal eyes and the teeth of the chelal fingers, as well as other specifically significant characteristics.

Synsphyronus (Synsphyronus) callus sp. nov.

Figures 13–15

Female. Description based on two individuals, the holotype and one female paratype. Measurements of the paratype are given in parentheses immediately after the corresponding measurements for the holotype whenever the two show significant difference. Body ovate; body, carapace, and legs light to moderately brown; palps deeper brown in color; sculpturing as typical in members of the genus; anterior legs somewhat stout, posterior legs relatively more slender; body 3.3 (3.25) mm. long. *Carapace* as usual in the genus; eyes of each side separated by about the diameter of the anterior eye, a sclerotic keel or ridge just anterior to the posterior eye; anterior eye of each side more or less circular in outline, posterior eye a little elliptical; four setæ along the posterior margin of the carapace; carapace 0.9 (0.95) mm. long, 0.1 mm. wide; ocular breadth about 0.55 mm. *Tergites* except the first divided; tergites 1 and 2 with four setæ, greatest number of setæ on any tergite is eight; all setæ subclavate; tergites 4 through 10 with a pigmented spot on each half-tergite. *Sternites* 4 and 5 nearly entire, sternites 6 through 10 divided; sternites 5 through 10 with darkly pigmented spots much as on the tergites; most sternites with six setæ, a few with eight setæ; setæ of anterior sternites usually acuminate, those of posterior sternites weakly subclavate. *Abdomen* oval in general shape, length about 2.4 mm., breadth about 1.9 mm.

Chelicera as usual in the genus; flagellum with the two short blades little more than one-fourth as long as the longest blade; the longest flagellar blade with one to three slender denticles near the center of the anterior margin; length of the chelicera about 0.23 mm., width of base 0.15 to 0.16 mm.; movable finger 0.165 (0.185) mm. long. *Fixed cheliceral finger* with three retroconical teeth on the distal half of the inner margin; inner margin of the apical tooth nearly edentate; apical tooth stout, terminally blunt; lamina exterior narrow. *Movable cheliceral finger* little curved, outer margin nearly straight; subapical lobe blunt, not well developed, approximate to the apical tooth in position; serrula exterior of 19 to 21 ligulate plates (condition and position of specimens preclude exact count); galea broken in all specimens, but evidently stout.

Palps (Fig. 13) with setæ of maxilla acuminate to subclavate; setæ of chelal fingers acuminate; all other palpal setæ clavate and relatively long; podomeres with the usual pseudoderm and sculpturing. Maxilla 0.47 (0.49) mm. long, 0.30 mm. wide; trochanter 0.42 mm. long, width at right angles to greatest length 0.34 (0.33) mm., width across the distal end 0.27 mm.; femur 0.98 mm. in length, 0.245 (0.25) mm. in width; tibia with length 0.73 (0.74) mm., width 0.27 (0.28) mm.; length of chela without pedicle 1.38 (1.43) mm., width 0.39 (0.375) mm.; chelal hand without pedicle 0.68 (0.7) mm. long, 0.33 mm. deep; movable finger 0.7 (0.75) mm. in length. Chelal teeth retroconical and cuspid at the distal end of the row of each finger, conical to rounded and acuspid at the proximal end of the row; fixed finger with 45 to 50 teeth, movable finger with about 35 teeth. Movable finger with one tactile seta, fixed finger with seven; setæ distributed as indicated in figure 14.

Legs as in the subgenus *Synsphyronus* except that the tarsus of one or more legs may have a suture dividing the tarsus into two parts, which, however, are never articulate; incompletely fused metatarsus and telotarsus may occur on the same animal as has some of the tarsal podomeres completely fused; tarsal claws stout; pedal chætotaxy much as in *S. niger* described above. *First leg* fairly stout; trochanter 0.235 mm. long, 0.16 mm. deep; pars basalis with extensor margin nearly straight, flexor margin weakly convex, length 0.26 mm., depth 0.135 mm.; pars tibialis with extensor margin nearly straight except near the proximal end in the holotype but somewhat evenly convex in the paratype, flexor margin moderately convex, length 0.25 mm., depth 0.16 mm.; tibia with extensor margin nearly straight, length 0.31 mm., depth 0.105 mm.; miotarsus (fused metatarsus and telotarsus) 0.285 (0.305) mm. long, 0.08 mm. deep. *Fourth leg* relatively slender; trochanter about 0.34 mm. long (broken in holotype and length not determined), 0.16 (0.17) mm. deep; pars basalis with a slight protuberance at the distal end of the nearly straight flexor margin, 0.275 mm. long, 0.16 mm. deep; pars tibialis with extensor margin a little flatly convex except at the ends, flexor margin nearly straight, length 0.55 (0.54) mm., depth 0.19 (0.185) mm.; entire femur 0.75 (0.74) mm. long; tibia weakly S-shaped, length 0.52 mm., depth 0.115 (0.11) mm.; miotarsus subcylindrical or a little fusiform, 0.38 (0.39) mm. long, 0.095 (0.09) mm. deep.

Genital complex simple, anterior operculum with six setæ, posterior operculum with six (paratype) or eight (holotype) setæ; two median cribiform plates, arranged one behind the other and with two or three very small accessory plates between; lateral plates subequal to or smaller than the anterior median plate.

Tritonymph. A single nymph, probably a tritonymph. Similar to the adult in general appearance and many details; appendages stouter and, especially the palpi, a little lighter in color; body 2.4 mm. long. *Carapace* 0.73 mm. long, 0.89 mm. wide across the posterior margin, ocular breadth about 0.45 mm. *Chelicera* much as in the adult; galea (Fig. 15) bifurcated at the very tip; serrula exterior of 16 plates. *Palpi* in general as in the adult, except podomeres somewhat smaller and stouter; femur 0.73 mm. long, 0.195 mm. wide; tibia 0.53 mm. long, 0.23 mm. wide; chela including pedicle 1.02 mm. in length, 0.30 mm. in width; length of hand including pedicle 0.53 mm.; movable finger 0.52 mm. long. Movable chelal finger with about 25 marginal teeth; one tactile seta, probably *t*, located somewhat distal to the midpoint of the finger. Fixed chelal finger with about 35 marginal teeth; six tactile setæ present and distributed as follows: *et* about one-third of the finger length from the tip; *it* on a level about one areolar diameter proximal to *et*; *est* located a little distal to the basal one-third of the finger; *ist* (?) and *ib* situated a little more than one-fifth of the finger length from the base of the finger and separated by less than one areolar diameter; a single exterior seta (probably *eb*) located near the base of the finger and considerably proximal to the level of *ib*. *Legs* similar to those of the adult but podomeres smaller and somewhat stouter.

Type locality. Australia. The female holotype from a collection taken on Rottnest Island, Western Australia, in December, 1931, by members of the Harvard Australian Expedition; the female paratype collected by Dr. P. J. Darlington at Cottesloe Beach, near Perth, Western Australia, on October 17, 1931; and the paratype nymph in a collection made by Dr. Darlington on October 24, 1931, at Rottnest Island, Western Australia.

Remarks. *Synsphyronus callus* is unique among members of the genus by having a combination of one tactile seta on the movable chelal finger and seven tactile setæ on the fixed chelal finger.

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EXPLANATION OF PLATES 2 AND 3

Drawings were made with the aid of a camera lucida. The tactile setæ are omitted from most of the dorsal views of the palpi and the marginal teeth are omitted from the exterior views of the chelæ.

PLATE 2

Fig. 1. *Olpium zealandiensis* sp. nov., galea, female holotype.

Fig. 2. *Olpium zealandiensis* sp. nov., dorsal view of palp, female holotype.

Fig. 3. *Olpium zealandiensis* sp. nov., exterior view of chela, female holotype.

Fig. 4. *Xenolpium granulosum* sp. nov., tip of movable cheliceral finger and galea, female holotype.

Fig. 5. *Xenolpium granulosum* sp. nov., dorsal view of palp, female holotype.

Fig. 6. *Xenolpium granulosum* sp. nov., exterior view of chela, female holotype.

Fig. 7. *Garypus longidigitus* sp. nov., dorsal view of palp, female holotype.

Fig. 8. *Garypus longidigitus* sp. nov., exterior view of chela, female holotype.

PLATE 3

Fig. 9. *Synsphyronus niger* sp. nov., dorsal view of palp, male holotype.

Fig. 10. *Synsphyronus niger* sp. nov., exterior view of chela, male holotype.

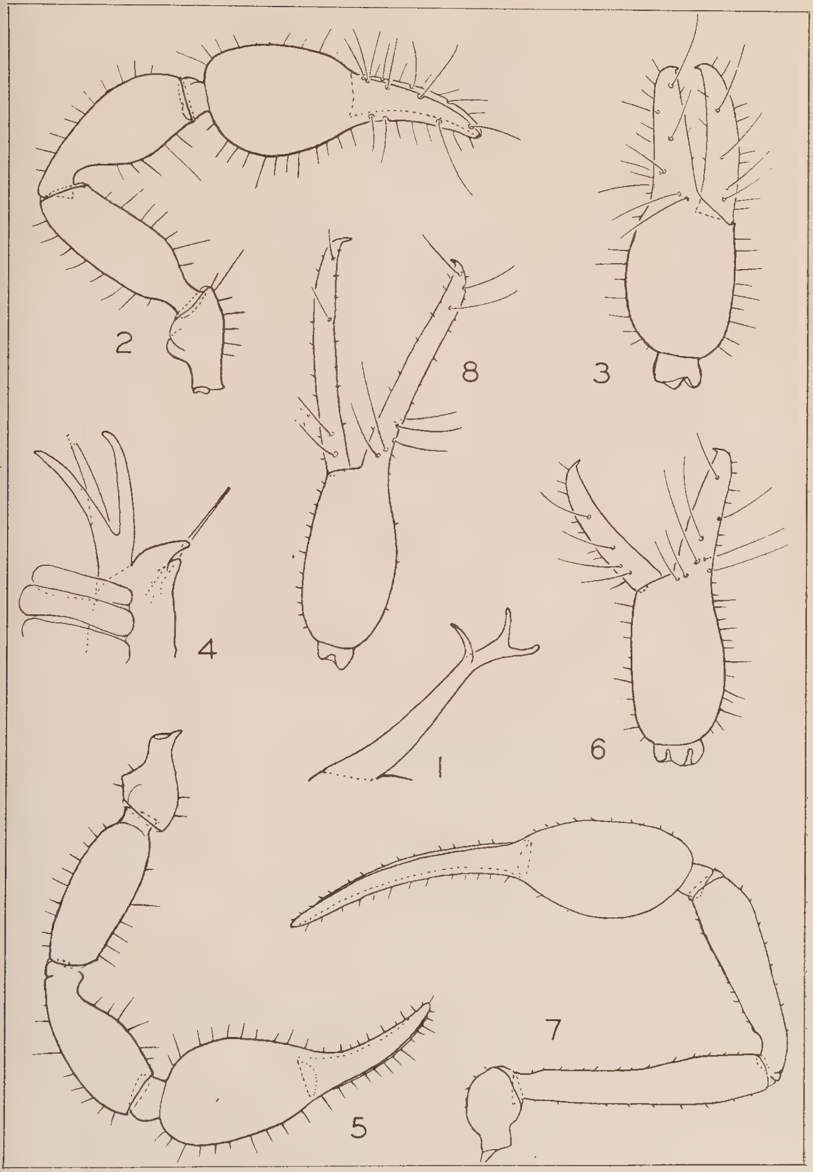
Fig. 11. *Synsphyronus magnus* sp. nov., dorsal view of palp, female holotype.

Fig. 12. *Synsphyronus magnus* sp. nov., exterior view of chela, female holotype.

Fig. 13. *Synsphyronus callus* sp. nov., dorsal view of palp, female holotype.

Fig. 14. *Synsphyronus callus* sp. nov., lateral view of chela, female holotype.

Fig. 15. *Synsphyronus callus* sp. nov., galea, nymphal paratype.



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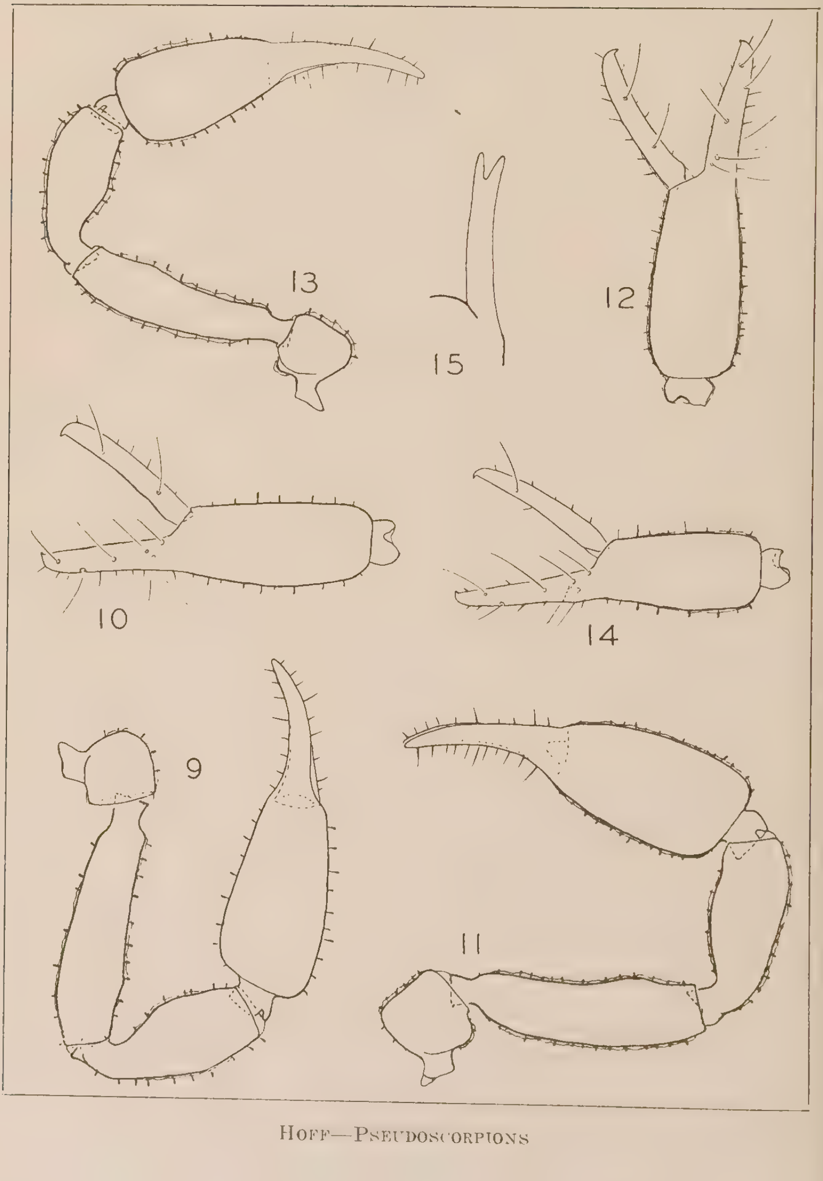
PSYCHE, 1947 VOL. 54, PLATE 3



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THE GENUS *CALLICTITA* (LEPIDOPTERA, LYCÆNIDÆ)[1]

By Robert G. Wind
Berkeley, California
and
Harry K. Clench
Cambridge, Massachusetts

In 1908 Bethune-Baker erected the genus *Callictita* for a single and very distinct new species, *cyara*, from the Angabunga River, British New Guinea. Eight years later Joicey and Talbot extended the range of this species by adding a new subspecies, *albiplaga*, from the Wandammen Mts. of Dutch New Guinea. Peculiarly, in Seitz' addenda to Volume 9 of the Macrolepidoptera of the World (1927) appears this same name *albiplaga,* but credited to Fruhstorfer, *i.l.*, with no mention of Joicey and Talbot whatsoever. Seitz figured the form, but gave no locality. His illustration looks suspiciously similar to that of Joicey and Talbot.

Fruhstorfer in Seitz (*loc. cit. infr.*) gives the following diagnosis of the genus: "Structure of the fore wings different from *Castalius* by the first subcostal immediately disappearing in the costal and crossing it. The subcostal fork is shorter, its branches more closely together than in *Castalius* or *Taraka.* Fore wing exhibits a roundish, large, discal black androconial area. Clasping organs highly specialized, œdeagus canaliculate as in *Upolampes.* Uncus remarkably feeble, short, narrow, but with very long apophysis. Valve trumpet-like, distally wide open, with a sharp dorsal tooth, everywhere extremely long-haired."

Callictita Bethune-Baker

Bethune-Baker, 1908, P.Z.S., 1908: 118. Genotype (by monotypy), *Callictita cyara* B.-B.
Fruhstorfer, 1923, [in] Seitz, Macrolep. World, 9: 891.

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[1] Published by a grant from the Museum of Comparative Zoölogy at Harvard College.

Apparently this genus is distributed from one end of New Guinea to the other, but only in the mountains.

Callictita cyara cyara Bethune-Baker

Callictita cyara Bethune-Baker, 1908, P.Z.S., 1908: 119, pl. 8, fig. 1; Fruhstorfer, 1923, [in] Seitz, Macrolep. World, 9: 891, pl. 145k.

Callictita albiplaga (*nec albiplaga* Joicey and Talbot): Jordan, 1930, Proc. Ent. Soc. London, 5: 60.

The species was described originally from the Angabunga River and Owgarra, in eastern New Guinea. Fruhstorfer (*loc. cit.*) records it as well from Mt. Gelu (1100 meters) in eastern New Guinea, and Jordan (*loc. cit.*) gives the Edie River, west side of the Herzog Mts., eastern New Guinea, April (?). In the Museum of Comparative Zoölogy is a series of 18 specimens from Mt. Misim (6000 feet), Morobe District, eastern New Guinea, taken Jan.–March, 1933, by Herbert Stevens.

Males above with the fore wing bright iridescent violet, with a central patch of jet black scales, and a narrow black outer marginal border. Hind wing is black-brown entirely, save for a central white patch, about the same size as the discal black patch of the fore wing.

Females above similar, save for: the slightly larger, somewhat less intense black discal patch of the fore wing above; the much broader outer marginal border, and the extension of this border in on the inner margin to the base, where it thickens up to the lower Dc. The hind wing is largely white, with a border of black-brown completely surrounding the wing, on costa, outer margin and inner margin, including the base. On the outer margin, near the anal angle, just outward of this band is a row of two or three white internervural dashes. A tail at Cu2.

Underside of male is white on both wings. The fore wing is crossed by four bands of black-brown, one on the margin, to 2A, one post-discal to Cu2, one discal to inner margin, and a basal one, covering the whole base, save for a costal dash of white. Hind wing has an irregular heavy dark band running from costa near base, across base, and along inner margin, frequently showing white within it (evidently remnants of white centering of spots). On the costa is a small triangular dark spot, reaching Rs, and rarely M1. Outer margin brown, with occasional marginal white spots, particularly in M3–Cu1. In Cu1–Cu2 is a jet-black marginal spot, ringed with metallic green, strongest basally, and rather weak outwardly, and in Cu2–2A is a jet-black dash, basally lined with a metallic green bar.

Females similar, but with the bar on the inner margin lacking the white, or almost lacking it. The costal triangular spot constantly reaches M1 instead of Rs.

Remarks. The male of the typical subspecies is apparently described here for the first time. Bethune-Baker erroneously sexed his specimens as males. Jordan (*loc. cit.*) evidently based his Edie River record of "*albiplaga* Fruhst." on males of this subspecies, though he failed to describe them.

Males of the three subspecies (*cyara, albiplaga*, and *arfakiana*) do not seem to differ on the upper surfaces, and only more material will tell whether the same is true of the females.

The real difference between the subspecies lies on the under surface. The pattern here varies consistently. From *albiplaga* the typical subspecies may be told by the more scalloped outer marginal border of the former, and the consequent increase in white outward of it. The band on the inner margin is in *albiplaga* more broken up into spots. In general, there appears to be a decrease in the amount of black in *albiplaga* in the hind wing below, but on the fore wing there is, if anything, an increase.

Typical *cyara* may be separated from *arfakiana* by the latter's smaller size, and the presence of two well-defined costal spots on the hind wing below, instead of one as in *cyara*. There is on this surface more metallic scaling in *arfakiana*, near the anal angle.

Callictita cyara albiplaga Joicey and Talbot

Callictita cyara albiplaga Joicey and Talbot, 1916, Ann. Mag. Nat. Hist., (8)17: 80, pl. 7, fig. 5.

Callictita cyara albiplaga Seitz, 1927, Macrolep. World, 9: 1114, pl. 147b.

Described from the Wandammen Mts. in Dutch New Guinea at an elevation of 3–4000 feet.

Differs from *cyara* in characters mentioned under that subspecies. From *arfakiana* it may be told by the more scalloped outer marginal border on the hind wing below, the defined spots on the inner margin and the single isolated spot on the costa (rather than two, as in *arfakiana*).

No specimens of this subspecies have been seen, but it is well described and illustrated, in color, by Joicey and Talbot.

Callictita cyara arfakiana, new subspecies

UPPERSIDE:

Male. Fore wing brilliant iridescent purple. Outer margin narrowly black-brown. A large central patch of jet-black raised scales. *Hind wing* black-brown with a central white patch. At Cu1–Cu2 in one specimen is a suggestion of a pale spot. A tail at Cu2.

UNDERSIDE:

Male. Fore wing white, crossed by four brown bands, one on the outer margin (with a faint streak of white outward of it), one post-discal (fusing with the first at Cu2), one discal (swelling at the inner margin and fusing with the basal), and a basal (which includes the whole base save for a small costal creamy bar). *Hind wing* white, with a long bar of black-brown running from costa at base to just basad of the anal angle, spotted infrequently with white. On the costa are two triangular spots, the inner reaching the center of the cell, the outer reaching M1 near the cell-end. On the outer margin is a band of brown from outer angle to M3, from M3 to anal angle becoming differentiated into three black spots ringed with metallic blue-green. Marginal to the whole band is a narrow line of white, thicker in M3–Cu1 and Cu2–2A.

Length of fore wing: Male, 11–11.5 mm.

Holotype, male, Mt. Siwi, Arfak, Dutch New Guinea, 800 meters, May 4, 1928 (Dr. E. Mayr).

Paratype, one male, same locality and collector, April–June, 1928.

Holotype and paratype in the American Museum of Natural History.

Remarks. Differs from both other subspecies in its smaller size, the presence of two, instead of one, costal spots on the hind wing below, and the large amount of metallic scaling near the anal angle of this wing below. Differences between *arfakiana* and each of the other two are discussed more fully above.

FIELD NOTES ON *TABANUS NIGROVITTATUS* MACQUART[1]

By N. S. Bailey
Cambridge, Mass.

This horsefly was the subject of an intensive study that was started in mid-July, 1946, and was suspended only with the advent of winter. The fly might well be called the Saltmarsh Greenhead since its immature stages are evidently quite dependent on the conditions of the *Spartina* zones for their development. Wherever expansive salt marshes occur—from Nova Scotia to Texas—this insect is known and may become locally abundant. At such times it is extremely annoying to man and to domestic animals. Despite its general coastal distribution and common occurrence, the literature records only meagre details of its life history or of its specific requirements. This paper reports some initial results of the current investigation.

Abundance. Two incidents will serve to emphasize how abundant the species is at the height of its season. In Essex County, Massachusetts they appear about the first of July each year and are at their peak for the last three weeks of that month. Usually there is a marked decline in their numbers by early August. The decline is augmented when a northeast storm brings a spell of unseasonably cold, wet weather. The past summer was typical in this respect.

My real introduction to this species came on the warm, sunny afternoon of July fifteenth. A call was made at the farm of Mr. Martin Burns on U. S. Route 1 in Newbury. He was found mowing a field that lies above and just south of the Parker River. Two sturdy grey horses were hitched to the mowing machine. Tabanids were swarming around the patient animals. Practically all were *Tabanus nigrovittatus*, although a few other types —notably *T. atratus* and *Chrysops* species—were observed. The team was flecked with blood from the fly bites. The clots showed plainly on their light coats and gave an indication of favored feeding areas. In order of decreasing frequency, the chest region, the head and neck, the median side of the upper legs, the flanks, and the belly received most attention from the flies. However, the Tabanids were all over them and allowed them no respite. They were experienced horses and maintained a remarkable calm considering the severity of the incessant attack.

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[1] This investigation of the biology of *T. nigrovittatus* is being conducted for a joint board of the State Department of Public Health and the State Reclamation Board with a grant from the Massachusetts Legislature. I wish to acknowledge the generosity of Dr. Joseph C. Bequaert, Curator of Insects in the Museum of Comparative Zoology, who freely devoted his time to the determination of the Tabanidæ and liberally assisted me in many other ways. For the progress of this study I am greatly indebted to his friendly guidance.

It has long been known that such conspicuous objects as automobiles attract Tabanids. July eighteenth was another bright, warm day. After lunch the writer drove out Argilla Road towards Crane's Beach, Ipswich. Where the road crosses Fox Creek its bed is raised well above the marshes. The coupé was parked just beyond the bridge while some observations were made. On returning to the car an astounding number of greenheads were noted in it. The thought of making a timed collection suggested itself. The results are numerically emphatic. They give graphic evidence of the abundance of the Saltmarsh Greenhead under favorable circumstances. In fifteen minutes actual collecting time a total of 475 flies were taken by simply lifting a half-pint bottle, containing some alcohol, under them when they alighted on the inner roof covering. The disturbance caused them to fly downward into the liquid which quickly dispatched them. This collecting, at the rate of more than thirty a minute, could unquestionably have been continued much longer without noticeably diminishing the supply.

Mating. The mating of Tabanids is seldom observed. On one occasion only it was my privilege to find several pairs of *T. nigrovittatus* in copulation. At that time, unfortunately, the rarity of such an event was not realized or more attention would have been given to details. The morning of July twenty-fifth was very warm, humid, and hazy-bright. There was still some fog lingering over the marsh at Conomo Point, Essex, when I arrived at nine-thirty. On approaching the Point, a sharp left turn was made over a small but abrupt rise from which the road falls quickly away to the tide line. The first cottage on the left was surrounded on three sides by salt marsh. There was a convenient place to park in front of it. Immediately after getting out on the marsh a continuous low buzzing sound was noted. Then swarms of greenheads were seen hovering just a few inches above the dense cover of the fine marsh grass (*Spartina patens*). On the far side of the cottage a slight depression was discovered where a small, sparse patch of the larger and coarser *Spartina alterniflora* stood. On the upper surface of the broader blades of these plants some mating pairs of greenheads were seen. One was resting on the back of the other with its head about over the mesothorax of the mate beneath. Although it was possible to approach the paired flies more closely than is usual with individuals, they remained alert and were not too easy to catch with the net. The carrier could still take off readily and fly rather well. If disturbed they would move to another plant two or three yards away while retaining their relationship. Four or five pairs were caught there and they included the first males taken. Another stop was made at the same place on August sixth. In the thirty or forty minutes then spent on the marsh only five or six flies were seen. This time the owner of the cottage mentioned above was there. After explaining the purpose of the visit to him, Mr. Derby remarked that a carpenter he had engaged to work on the building in a previous year had told him of the hum produced by the hovering flies. This volunteered information was of interest in the light of my own experience. That spot is apparently a regular mating place for this species.

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